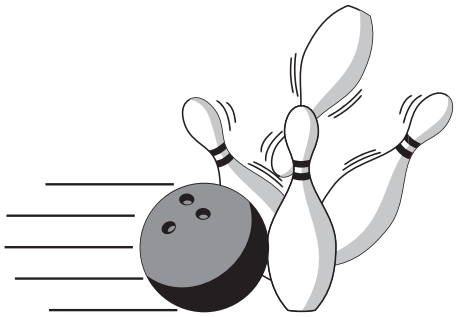
Subtraction Action!

Name _____

Here is another way to solve subtraction problems!

Add equal amounts to the equation. This will not change the answer. (The difference between the two numbers is the same.)

$$76 - 39 = 37$$
$$(10 + 76) - (10 + 39) = 37$$



Use the following process when your problem is in work form:

Rename 6 as 16 by adding 10 ones.
Rename 3 tens as 4 tens by adding 1 ten.
Subtract.

$$\begin{array}{r} 7\,\overset{4}{\cancel{3}}\,\overset{16}{\cancel{6}} \\ -\,3\,9 \\ \hline 3\,7 \end{array}$$

Sometimes it is necessary to add equal amounts more than once.

$$\begin{array}{r} 723 \\ -\,468 \\ \hline \end{array} \longrightarrow \begin{array}{r} 7\,2\,\overset{13}{\cancel{3}} \\ -\,4\,\overset{7}{\cancel{6}}\,8 \\ \hline 5 \end{array} \longrightarrow \begin{array}{r} 7\,\overset{12}{\cancel{2}}\,\overset{13}{\cancel{3}} \\ -\,\overset{5}{\cancel{4}}\,\overset{7}{\cancel{6}}\,8 \\ \hline 2\,5\,5 \end{array}$$

Subtract using this method.

1. $\begin{array}{r} 3\,1\,\overset{15}{\cancel{5}} \\ -\,\overset{1}{\cancel{2}}\,0\,9 \\ \hline 106 \end{array}$

2. $\begin{array}{r} 8\,\overset{13}{\cancel{3}}\,6 \\ -\,\overset{3}{\cancel{2}}\,4\,2 \\ \hline 594 \end{array}$

3. $\begin{array}{r} 7\,\overset{14}{\cancel{4}}\,\overset{15}{\cancel{5}} \\ -\,\overset{5}{\cancel{4}}\,\overset{9}{\cancel{8}}\,8 \\ \hline 257 \end{array}$

4. $\begin{array}{r} 3\,6\,\overset{12}{\cancel{2}} \\ -\,\overset{2}{\cancel{1}}\,\overset{0}{\cancel{9}}\,3 \\ \hline 169 \end{array}$

5. $\begin{array}{r} 4\,\overset{10}{\cancel{0}}\,\overset{12}{\cancel{2}} \\ -\,\overset{3}{\cancel{2}}\,\overset{6}{\cancel{5}}\,5 \\ \hline 147 \end{array}$

6. $\begin{array}{r} 7\,\overset{12}{\cancel{2}}\,9 \\ -\,\overset{6}{\cancel{5}}\,3\,7 \\ \hline 192 \end{array}$

7. $\begin{array}{r} 8\,\overset{12}{\cancel{2}}\,\overset{13}{\cancel{3}} \\ -\,\overset{5}{\cancel{4}}\,\overset{6}{\cancel{5}}\,8 \\ \hline 365 \end{array}$

8. $\begin{array}{r} 2\,9\,\overset{14}{\cancel{4}} \\ -\,\overset{9}{\cancel{8}}\,7 \\ \hline 207 \end{array}$

9. $\begin{array}{r} 3\,\overset{11}{\cancel{1}}\,9 \\ -\,\overset{2}{\cancel{1}}\,3\,5 \\ \hline 184 \end{array}$

Consecutive Numbers

Name _____

- A, B, and C are consecutive letters of the alphabet.
- Washington, Adams, Jefferson, and Madison were consecutive presidents of the United States.
- 1995, 1996, and 1997 are consecutive years.

Write a definition for the word *consecutive*. You may use a dictionary if necessary.

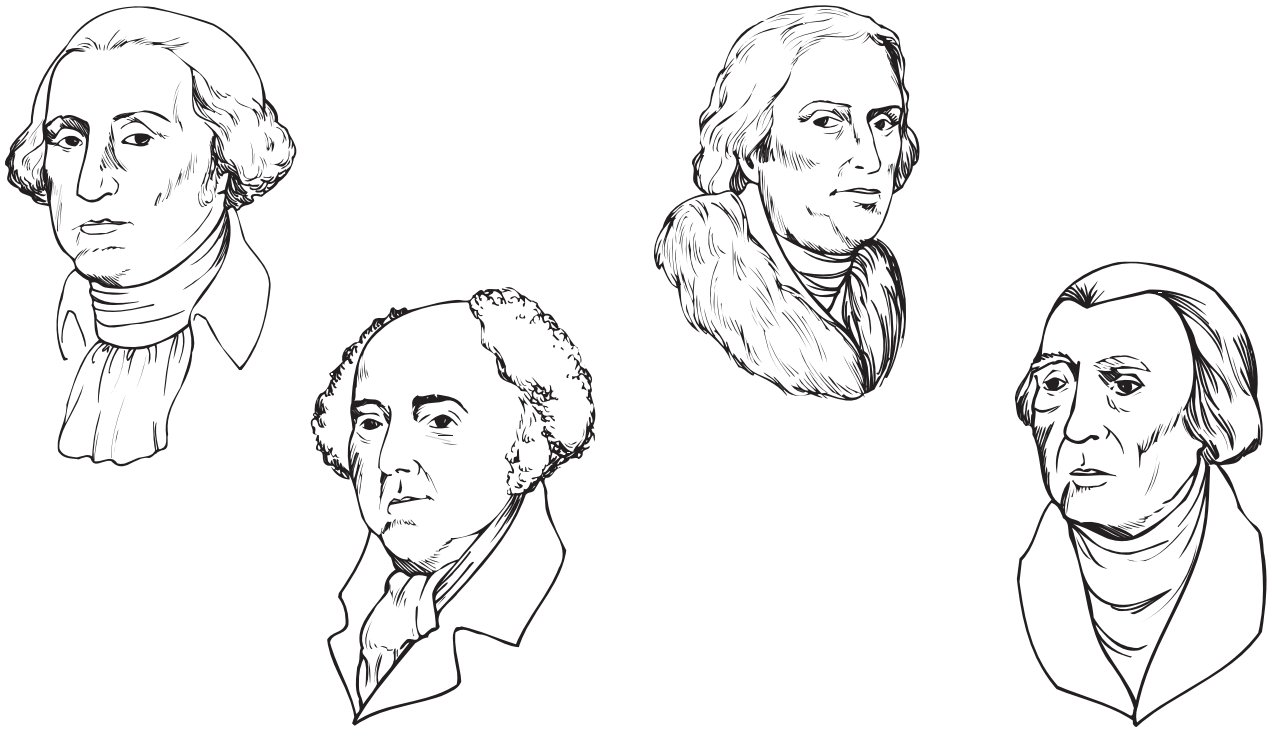
1. *Answers will vary.*

Answer the questions. You may use a calculator if necessary.

2. Which two consecutive numbers have a sum of 75? *37* *38*
3. Which two consecutive numbers have a sum of 63? *31* *32*
4. Which three consecutive numbers have a sum of 216? *71* *72* *73*
5. Which four consecutive numbers have a sum of 238? *58* *59* *60* *61*
6. Explain how to find the consecutive numbers that add up to a given number.

   Divide the sum by the number of addends to find the average of the addends.

   Add number(s) immediately before and after the average addend until the sum is found.

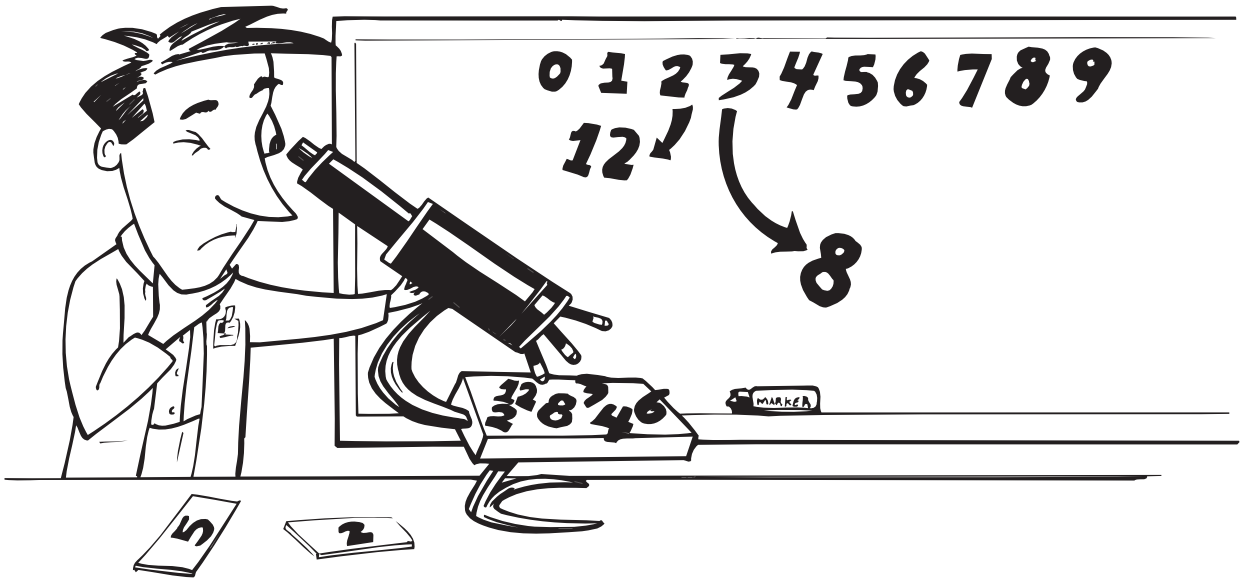


Factor Search

Name _____

Circle the groups of numbers that when multiplied together equal 24. There may be 2, 3, or 4 factors in a group. Groups may be vertical, horizontal, or diagonal. The same number may be used in more than one group. Try to find at least 14 groups!

2	2	2	3	5	3
5	4	5	2	1	8
3	5	6	4	9	3
5	3	6	12	2	12
12	2	7	4	11	4
2	4	2	3	2	2



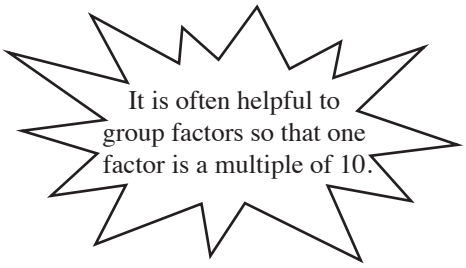
New Associations

Name _____

You can use the Associative Property of Multiplication to help you solve multiplication problems. They can often be changed so that you have to use only the multiplication facts you already know. ***Equations may vary.***

$3 \times 14 =$

- Split one number into two factors. $3 \times (2 \times 7) =$
- Group factors in the simplest way. $(3 \times 2) \times 7 =$
- Multiply the factors. $6 \times 7 = 42$



Solve using the procedure shown above. Write the equations you use.

1. $3 \times 18 =$ ***54***

3 × (2 × 9) =
(3 × 2) × 9 =
6 × 9 = 54

2. $3 \times 21 =$ ***63***

3 × (3 × 7) =
(3 × 3) × 7 =
9 × 7 = 63

3. $15 \times 4 =$ ***60***

(3 × 5) × 4 =
3 × (5 × 4) =
3 × 20 = 60

4. $5 \times 26 =$ ***130***

5 × (2 × 13) =
(5 × 2) × 13 =
10 × 13 = 130

5. $4 \times 16 =$ ***64***

4 × (2 × 8) =
(4 × 2) × 8 =
8 × 8 = 64

6. $4 \times 35 =$ ***140***

4 × (5 × 7) =
(4 × 5) × 7 =
20 × 7 = 140

7. $4 \times 22 =$ ***88***

4 × (2 × 11) =
(4 × 2) × 11 =
8 × 11 = 88

8. $3 \times 15 =$ ***45***

3 × (3 × 5) =
(3 × 3) × 5 =
9 × 5 = 45

9. $2 \times 24 =$ ***48***

2 × (3 × 8) =
(2 × 3) × 8 =
6 × 8 = 48

Sometimes you may be able to split both factors and regroup the factors to form a simple multiplication problem.

10. $14 \times 25 =$ ***350***

(2 × 7) × (5 × 5) =
(2 × 5) × (7 × 5) =
10 × 35 = 350

11. $12 \times 15 =$ ***180***

(4 × 3) × (3 × 5) =
(3 × 3) × (4 × 5) =
9 × 20 = 180

Compensation Multiplication

Name _____

Here is an interesting way to multiply numbers that are close to but not greater than 100!

$92 \times 96 =$

- Write down how far away from 100 each factor is. These are called the compensated numbers.

$$\begin{array}{r} 96 \quad (4) \\ \times\ 92 \quad (8) \end{array}$$

4 and 8 are the compensated numbers.

- Subtract one of the compensated numbers from the opposite factor. The answer becomes the first two digits of the product.

$96 - 8 = 88$ or $92 - 4 = 88$

$$\begin{array}{r} 96 \\ \times\ 92 \\ \hline 88 \end{array}$$

- Multiply the two compensated numbers together. The answer becomes the last two digits of the product.

$4 \times 8 = 32$

$$\begin{array}{r} 96 \\ \times\ 92 \\ \hline 8{,}832 \end{array}$$

Find the product using compensated numbers.

1. 95×97 (5, 3) = **9,215**
2. 90×91 (10, 9) = **8,190**
3. 98×88 (2, 12) = **8,624**
4. 94×96 (6, 4) = **9,024**

For numbers that are greater than 100, follow the same steps, except that you will add the compensated number to the opposite factor for the second step.

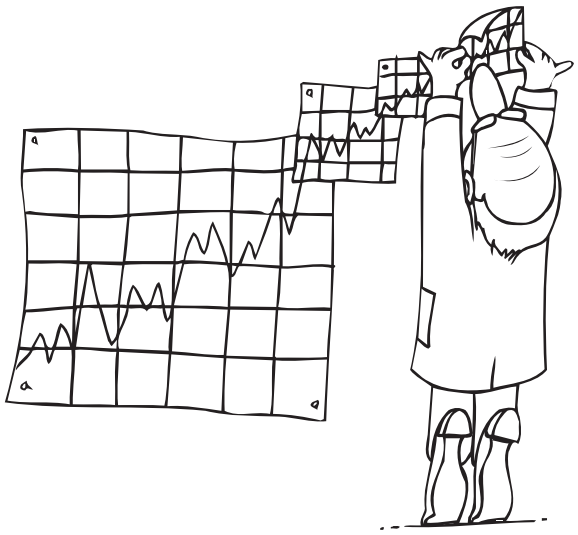
$$\begin{array}{r} 103 \quad (3) \\ \times\ 107 \quad (7) \\ \hline 11{,}021 \end{array}$$

$103 + 7 = 110$

$3 \times 7 = 21$

Find the product using compensated numbers.

5. 105×102 (5, 2) = **10,710**
6. 103×104 (3, 4) = **10,712**
7. 109×106 (9, 6) = **11,554**
8. 101×105 (1, 5) = **10,605**



Symmetric Multiplication

Name _____

Use a calculator to multiply.

1. 555 × 555 = *308,025*
2. 33 × 88 = *2,904*
3. 222 × 333 = *73,926*

Here is an interesting way to solve these problems. Study the examples.

```
    5 5 5
  × 5 5 5
  -------
    2 5
  2 5 2 5
2 5 2 5 2 5
  2 5 2 5
    2 5
  -------
3 0 8,0 2 5
```

one 25
two 25s
three 25s
two 25s
one 25

```
    8 8
  × 3 3
  -------
    2 4
  2 4 2 4
    2 4
  -------
2,9 0 4
```

one 24
two 24s
one 24

```
      3 3 3
    × 2 2 2
    -------
      0 6
    0 6 0 6
0 6 0 6 0 6
    0 6 0 6
      0 6
    -------
7 3,9 2 6
```

one 6
two 6s
three 6s
two 6s
one 6

Notice the pattern for three-digit factors is (1, 2, 3, 2, 1) and the pattern for two-digit factors is 1, 2, 1.

4. What is the pattern for four-digit factors? *1, 2, 3, 4, 3, 2, 1*

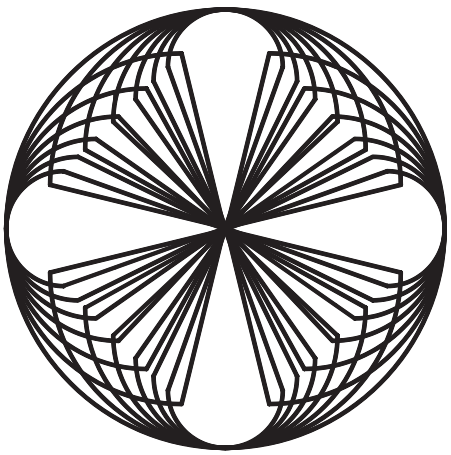
This is called symmetric multiplication.

Use symmetric multiplication to find the product of these numbers.

5.
```
    8 8
  × 8 8
  -------
    6 4
  6 4 6 4
    6 4
  -------
```
7,744

6.
```
      5 5 5
    × 2 2 2
    -------
      1 0
    1 0 1 0
1 0 1 0 1 0
    1 0 1 0
      1 0
    -------
```
123,210

7.
```
        7 7 7 7
      × 7 7 7 7
      ---------
        4 9
      4 9 4 9
    4 9 4 9 4 9
  4 9 4 9 4 9 4 9
    4 9 4 9 4 9
      4 9 4 9
        4 9
      ---------
```
60,481,729



Mental Math Mania

Name _____

Use mental math techniques to solve the following problems. Guess if you need to! Then check your answers.

1. Write the digits 9, 8, and 7 once in each of the boxes. Make a product as close to 700 as possible without going over.

$$\begin{array}{r} 9\ 8 \\ \times\ \ 7 \\ \hline 686 \end{array}$$

2. Write the digits 5, 6, 7, and 8 once in each of the boxes. Make a sum that is between 140 and 150.

$$\begin{array}{r} 7\ 8 \\ +\ 6\ 5 \\ \hline 143 \end{array}$$

Answers may vary.

3. Write the digits 2, 4, 6, and 8 once in each of the boxes. Make a difference that is between 10 and 20.

$$\begin{array}{r} 4\ 6 \\ -\ 2\ 8 \\ \hline 14 \end{array}$$

Answers may vary.

4. Write the digits 3, 5, and 8 once in each of the boxes. Make two problems with products as close to 180 as possible. One should be less than 180 and the other should be greater than 180.

$$\begin{array}{r} 5\ 8 \\ \times\ \ 3 \\ \hline 174 \end{array} \qquad \begin{array}{r} 3\ 8 \\ \times\ \ 5 \\ \hline 190 \end{array}$$

5. Write the digits 3, 5, 7, and 9 once in each set of boxes. The problems should be different, but the answers should both be 18.

$$\begin{array}{r} 5\ 7 \\ -\ 3\ 9 \\ \hline 18 \end{array} \qquad \begin{array}{r} 9\ 3 \\ -\ 7\ 5 \\ \hline 18 \end{array}$$

Surveying Properties

Name _____

Letters or symbols can be used to represent numbers in equations. Each equation shown here corresponds to one of the mathematical properties listed in the box.

Associative Property of Multiplication	Associative Property of Addition
Identity Property of Multiplication	Identity Property of Addition
Zero Principle of Subtraction	Zero Principle of Multiplication
Commutative Property of Addition	Commutative Property of Multiplication
Distributive Property	

Write the name of the correct property.

1. $\square \times \triangle = \triangle \times \square$ — *Commutative Property of Multiplication*
2. $r - 0 = r$ — *Zero Principle of Subtraction*
3. $^{-}n + y = y + {}^{-}n$ — *Commutative Property of Addition*
4. $\triangle + 0 = \triangle$ — *Identity Property of Addition*
5. $\square \times (\triangle + \pentagon) = (\square \times \triangle) + (\square \times \pentagon)$ — *Distributive Property*
6. $(\triangle + \square) + \pentagon = \triangle + (\square + \pentagon)$ — *Associative Property of Addition*
7. $p \times 0 = 0$ — *Zero Principle of Multiplication*
8. $(s \times {}^{-}p) \times y = s \times ({}^{-}p \times y)$ — *Associative Property of Multiplication*
9. $y \times 1 = y$ — *Identity Property of Multiplication*

Write an equation (using numbers) for each property. *Answers will vary. Sample answers are given.*

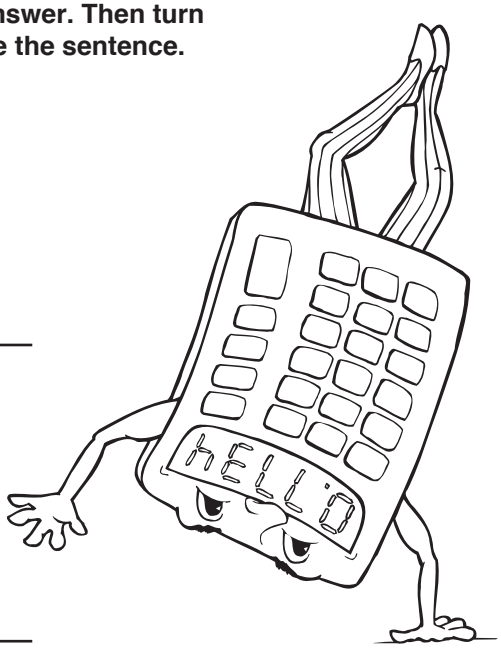
10. Commutative Property of Multiplication — *3 × 2 = 2 × 3*
11. Zero Principle of Subtraction — *8 – 0 = 8*
12. Distributive Property — *4 × 24 = (4 × 20) + (4 × 4)*
13. Identity Property of Addition — *10 + 0 = 10*
14. Associative Property of Multiplication — *3 × (2 × 5) = (3 × 2) × 5*
15. Identity Property of Multiplication — *4 × 1 = 4*

Calculator Riddles

Name _____

Did you know your calculator can write words?

Use your calculator to solve each problem. Write the number answer. Then turn the calculator upside down to reveal the word that will complete the sentence.



1. Bubble, bubble in the pot.
   This happens to water when it gets hot!

   Step A: multiply 758 by 87
   Step B: add 214
   Step C: subtract 9,052

   number ***57,108*** word ***Boils***

2. In Hawaii they leave me outside the door
   But take me along when they go to the store!

   Step A: multiply 742 by 58
   Step B: add 12,219
   Step C: subtract 2,210

   number ***53,045*** word ***Shoes***

Make your own riddle! This table shows the letters that can be made using the digits on a calculator. Follow these steps to make a riddle.

0 = O or D	4 = H	7 = L
1 = I or L	5 = S	8 = B
3 = E	6 = G	9 = G

1. Make up a word using the letters from the table.
2. Make up a riddle that uses this word.
3. Enter the corresponding numbers on the calculator, starting with the end of the word.
4. Make up a problem that has this number as the answer.
   a. Each problem should have 3 steps.
   b. Each part of the problem should use a different operation (addition, subtraction, multiplication, division).

Answers will vary.

Word: _____ Number: _____

Riddle: _____

_____

Step A: _____

Step B: _____

Step C: _____

Copy your riddle and three steps, and give it to a friend!

Patterns!

Name _____

Each row has a different pattern. Identify the pattern and complete the row.
Your teacher may allow you to use a calculator.

1. pattern: × 3 – 1

2	5	14	41	122	365	1,094	3,281	9,842

2. pattern: × 2 + 5

2	9	23	51	107	219	443	891	1,787	3,579

3. pattern: squares

1	4	9	16	25	36	49	64	81

4. pattern: – 1 × 2 or × 2 – 2

5	8	14	26	50	98	194	386	770	1,538

5. pattern: add two preceding numbers

1	1	2	3	5	8	13	21	34	55	89

6. pattern: ÷ 2 + 2 or + 4 ÷ 2

100	52	28	16	10	7	5.5	4.75	4.375

7. pattern: – 3

5	2	$^{-}1$	$^{-}4$	$^{-}7$	$^{-}10$	$^{-}13$	$^{-}16$	$^{-}19$	$^{-}22$

Big Prime

Name _____

You have learned how to find prime numbers using the Sieve of Eratosthenes. To find prime numbers less than 1,000, cross out the multiples of the first 11 prime numbers (2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31). You may use a calculator. Circle the prime numbers.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275
276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325
326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350
351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375
376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425
426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475
476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525
526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550
551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575
576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600
601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625
626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650
651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675
676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700
701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725
726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750
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776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800
801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825
826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850
851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875
876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900
901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925
926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950
951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975
976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1,000

How many prime numbers are there between 1 and 1,000? **168**

Charting Game

Name _____

This game can be played by two or more people. Each person has ten minutes to write one example in each square on the following chart. At the end of ten minutes, each person takes a turn reading the answers he has on the chart. The other players mark off any square where they have the same answer. After each player has read his answers, the player with the most squares not marked off is the winner.

Answers will vary.

	Prime	Divisible by 3	Divisible by 4	Divisible by 5	Divisible by 9
0–50					
51–100					
101–150					
151–200					
over 200					

Who Am I?

Name _____

Use the clues to identify the correct number. Circle the number.

1. My hundreds digit is my smallest digit.
   I am an even number.
   I am divisible by 3.
   My ones digit is 3 times my tens digit.

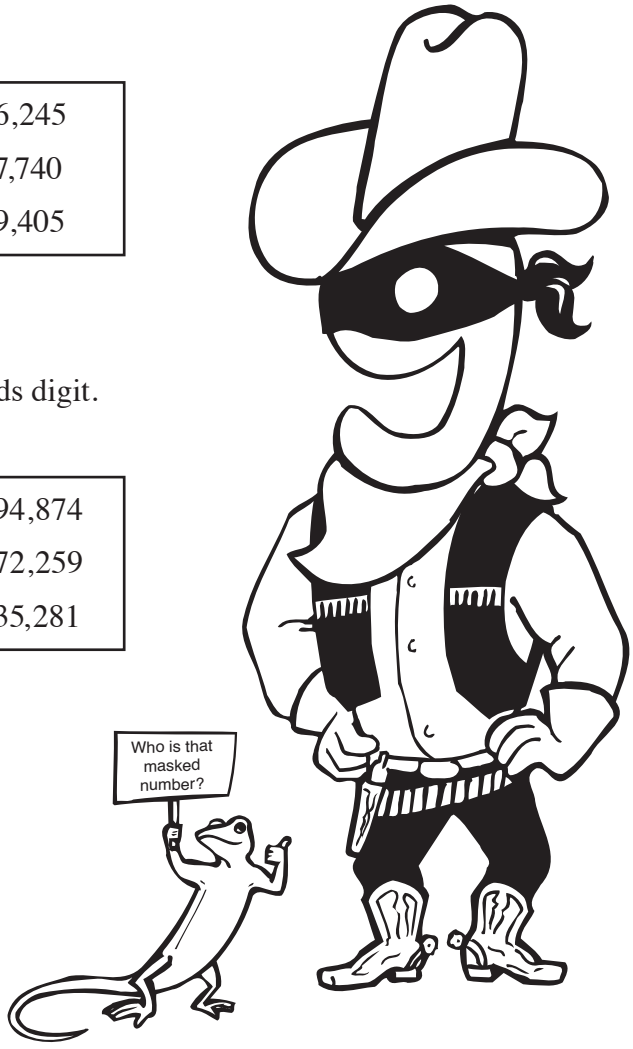
35,127	81,036	61,230	11,026
53,238	71,226	45,126	57,132
11,142	46,232	32,013	62,139

2. I am divisible by 5.
   The sum of my digits is 18.
   My tens digit is smaller than my ones digit.
   My smallest digit is 2.

3,915	7,623	2,385	6,245
4,725	9,440	6,930	7,740
6,615	2,790	4,275	9,405

3. My hundreds digit is 2 times my ones digit.
   My tens digit is greater than my ten thousands digit.
   I am divisible by 9.

12,241	56,663	31,854	94,874
25,773	81,563	75,432	72,259
33,785	25,492	54,693	35,281



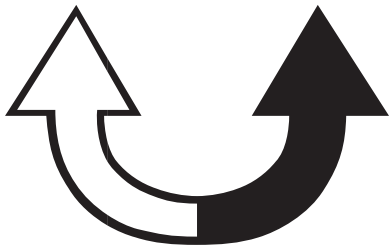
Division Match-Up

Name _____

Use what you know about estimating to match the quotient with the correct dividend and divisor. Use each number only once. Check your work on a separate sheet of paper.

Divisors:	81	16	41	22	36	63
Dividends:	783	866	932	501	698	578

1. 58 r4 = 932 ÷ 16
2. 35 r13 = 783 ÷ 22
3. 12 r9 = 501 ÷ 41
4. 24 r2 = 866 ÷ 36
5. 11 r5 = 698 ÷ 63
6. 7 r11 = 578 ÷ 81



Use a calculator to find the divisor by "undoing" the multiplication check:

1. Subtract the remainder from the dividend.
2. Divide the number by the quotient.
3. Write the divisor.

7. 16)409 — 25 r9
8. 15)648 — 43 r3
9. 24)941 — 39 r5
10. 35)636 — 18 r6
11. 6)549 — 91 r3
12. 83)1,421 — 17 r10
13. 66)1,422 — 21 r36
14. 47)2,785 — 59 r12
15. 98)705 — 7 r19

Estimating

Name _____

Each of the numbers in a cloud is the estimated quotient of a number from group 1 divided by a number from group 2. Fill in the blanks with numbers from the appropriate group that when rounded will give the estimated quotient. (Numbers can be used more than once.)

Group 1 (dividends)		
1,032	4,852	35,814
23,952	19,751	

Group 2 (divisors)			
63	807	598	419
48	502	291	

Example:

(50) → 23,952 ÷ 419

Estimated quotient — Group 1 — Group 2

After estimating mentally, use a calculator to solve each equation. Round to the nearest thousandth.

1.	(20)	1,032	÷	48	=	21.5
2.	(400)	19,751	÷	48	=	411.479
3.	(30)	23,952	÷	807	=	29.680
4.	(600)	35,814	÷	63	=	568.476
5.	(10)	4,852	÷	502	=	9.665
6.	(80)	23,952	÷	291	=	82.309
7.	(60)	35,814	÷	598	=	59.890
8.	(90)	35,814	÷	419	=	85.475

Best Buys

Name _____

Mrs. Harris always compares prices at the grocery store. In order to compare the prices of two items of different sizes, she must know the cost per ounce of the item. Mrs. Harris divides the total price by the number of ounces to find the cost per ounce. She uses a calculator at the store and rounds the price to the nearest cent.

$0.53

$0.53 ÷ 16 = 0.033 → $0.03 per ounce

$0.48

$0.48 ÷ 12 = 0.04 → $0.04 per ounce

Use a calculator to find the cost per ounce. Round to the nearest cent. Fill in the blanks. Compare each pair of items by writing < or > in the blank. Circle the better buy.

1. **beans**
   16 oz for $0.41 = *$0.03* per oz > 15 oz for $0.37 = *$0.02* per oz
2. **bacon**
   12 oz for $1.49 = ***$0.12*** per oz > 40 oz for $3.97 = ***$0.10*** per oz
3. **tuna**
   6 oz for $0.65 = ***$0.11*** per oz < 12 oz for $1.59 = ***$0.13*** per oz
4. **corn**
   7 oz for $0.44 = ***$0.06*** per oz > 15 oz for $0.59 = ***$0.04*** per oz
5. **soup**
   11 oz for $0.99 = ***$0.09*** per oz > 19 oz for $1.59 = ***$0.08*** per oz
6. **crackers**
   10 oz for $0.99 = ***$0.10*** per oz < 15 oz for $1.59 = ***$0.11*** per oz
7. **cereal**
   12 oz for $2.79 = ***$0.23*** per oz > 18 oz for $3.55 = ***$0.20*** per oz
8. **soft drink**
   68 oz for $0.89 = ***$0.01*** per oz < 101 oz for $1.59 = ***$0.02*** per oz
9. **cream**
   10 oz for $2.23 = ***$0.22*** per oz < 15 oz for $3.69 = ***$0.25*** per oz
10. **shampoo**
    10 oz for $2.29 = ***$0.23*** per oz > 15 oz for $2.19 = ***$0.15*** per oz

Rocket Rates

Name _____

Write an equation for each word problem. Solve the problems on a separate sheet of paper. Write and label the answer. ***Problem-solving procedures will vary.***

1. Yuri Gagarin was the first man in space. His rocket, *Vostok I*, traveled about 18,000 miles per hour to stay in orbit around the earth. How far would the rocket travel in 5 hours?

   5 × 18,000 = 90,000 miles

2. At that speed how many times could he orbit the earth in 5 hours? (Hint: His orbit around the earth was about 32,400 miles.)

   90,000 ÷ 32,400 = 2.$\overline{7}$ ≈ 2.78 times

3. When traveling at 18,000 miles per hour, what was Gagarin's speed in miles per minute? How many miles per second?

   18,000 ÷ 60 = 300 mi per min 300 ÷ 60 = 5 mi per sec

4. How many minutes would it have taken Gagarin to orbit the earth 3 times?

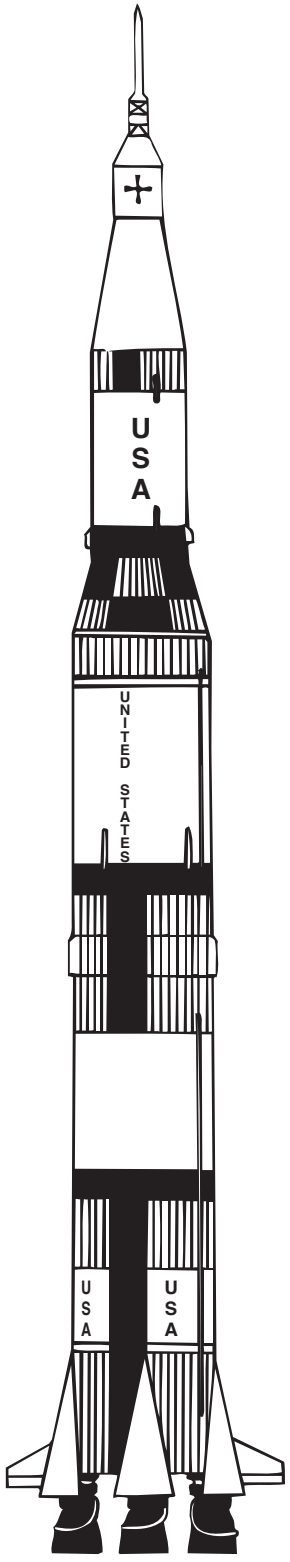
   3 × 32,400 = 97,200 97,200 ÷ 300 = 324 min

5. One Apollo flight orbited the earth 163 times in approximately 260 hours, 9 minutes. What was the average time for each orbit? (Round to the nearest minute.)

   [(60 × 260) + 9] ÷ 163 = 95.8 96 min or 1 hr 36 min

6. An Apollo spacecraft accelerated to a speed of 39100 kilometers per hour to escape earth's gravity when rocketing to the moon. How many miles per hour is this? (Hint: 1 mi = 1.609 km)

   39100 ÷ 1.609 = 24,300.81 mph



Did you know . . .

When the astronauts from the Apollo missions returned to earth in their capsule, they had to be very precise in the geometric angle of their reentry into earth's atmosphere. If the angle had been less than 5 degrees below the horizon, the capsule would have skipped off the atmosphere and bounced back into space. If the angle had been more than 7 degrees below the horizon, the capsule would have burned up in the atmosphere.

Play Krypto!

Name _____

Rules for Krypto

1. Choose a number between 30 and 50. This is your *target number*.
2. Choose any five numbers between 1 and 20. These are your *working numbers*.
3. Add, subtract, multiply, or divide the working numbers to arrive at the target number. Each number may be used more than once. Try to use as few steps as possible.

Example:

Target number: 32
Working numbers: 6, 7, 10, 5, 2
Answer: $2 \times 5 \times 7 - 6 \div 2 = 32$

10 70 64 32

For Krypto, do all operations from left to right.

Play Krypto with the following numbers. Your teacher may allow you to work with a partner. The first person to get the right answer wins! Write the equations you use. (Your teacher may allow you to use a calculator.)

Answers will vary.

1. 31 2 12 3 8 6	**2.** 35 5 1 6 8 9
3 × 12 – 3 – 2 = 31	***1 + 6 × 5 = 35***
3. 45 8 10 12 3 7	**4.** 35 6 4 9 12 10
10 – 3 × 7 – 12 + 8 = 45	***4 × 12 – 9 + 6 – 10 = 35***
5. 37 6 9 5 3 13	**6.** 36 15 11 10 8 4
5 – 3 × 9 + 13 + 6 = 37	***4 × 10 – 4 = 36***
7. 32 3 4 8 9 11	
8 × 9 ÷ 4 + 11 + 3 = 32	

Choose your own numbers.

It's fun to play Krypto in teams!

Play again!

Egyptian Division

Name _____

You can use a process similar to that used by the ancient Egyptians to solve division problems.

1. Double the divisor until the next double would be greater than the dividend.
2. Subtract the greatest double from the dividend. Make a note of the factor to the right of the problem.
3. Continue subtracting until the remainder is less than the divisor. This is the remainder.
4. Add the factors to the right of the problem. This is the quotient.
5. Write the equation.

423 ÷ 22 =

1 × 22 = 22
2 × 22 = 44
4 × 22 = 88
8 × 22 = 176
16 × 22 = 352

22)423
−352 → 16
71
−44 → 2
27
−22 → + 1
5 → 19
(remainder) (quotient)

423 ÷ 22 = 19 r5

32 × 22 is twice as much as 352. It's too much!

Use the Egyptian method to divide. Solve the problems on a separate sheet of paper. Write the multiplication equations you use.

1. 242 ÷ 34 = *7 r4*

1 × 34 = 34
2 × 34 = 68
4 × 34 = 136
8 × 34 = 272

2. 916 ÷ 70 = *13 r6*

1 × 70 = 70
2 × 70 = 140
4 × 70 = 280
8 × 70 = 560
16 × 70 = 1120

3. 297 ÷ 12 = *24 r9*

1 × 12 = 12
2 × 12 = 24
4 × 12 = 48
8 × 12 = 96
16 × 12 = 192

4. 731 ÷ 43 = *17*

1 × 43 = 43
2 × 43 = 86
4 × 43 = 172
8 × 43 = 344
16 × 43 = 688

5. 629 ÷ 33 = *19 r2*

1 × 33 = 33
2 × 33 = 66
4 × 33 = 132
8 × 33 = 264
16 × 33 = 528

6. 897 ÷ 56 = *16 r1*

1 × 56 = 56
2 × 56 = 112
4 × 56 = 224
8 × 56 = 448
16 × 56 = 896

Cross Number Puzzles

Name _____

Fill in the boxes with the numbers and the symbols (+, –, ×, ÷) that will make all the equations true.

Answers will vary.

1.

12.6	×	5	=	63
–		×		÷
10	÷	2	=	5
=		=		=
2.6	+	10	=	12.6

2.

25.5	÷	6	=	4.25
×		–		×
4	+	2	=	6
=		=		=
102	÷	4	=	25.5

Squaring 5

Name _____

$25^2 = 25 \times 25$

To solve this equation we usually set it up in vertical form like this:

$$\begin{array}{r} 25 \\ \times\ 25 \\ \hline 125 \\ +\ 500 \\ \hline 625 \end{array}$$

There is an easier and quicker way to square numbers that end with 5.

- Multiply the front digit by 1 more than itself. This is the front end of the answer.
- The last two digits of the answer will be 25.

$45^2 =$ (4 × 5 = 20)

$45^2 = 2{,}025$

Note: If the number being squared has 3 digits, multiply the front 2 digits by 1 more than themselves.

$105^2 = 11{,}025$ (10 × 11 = 110)

Use the method shown above to complete the equations.

1. $35^2 =$ 1,225
2. $55^2 =$ 3,025
3. $65^2 =$ 4,225
4. $75^2 =$ 5,625
5. $85^2 =$ 7,225
6. $95^2 =$ 9,025
7. $115^2 =$ 13,225
8. $15^2 =$ 225
9. $125^2 =$ 15,625
10. $155^2 =$ 24,025
11. $145^2 =$ 21,025
12. $135^2 =$ 18,225

Will this work for decimals? Try it!

13. $2.5^2 =$ 6.25
14. $10.5^2 =$ 110.25
15. $8.5^2 =$ 72.25

Exponents

Name _____

The base tells what number is used as a factor. The exponent tells the number of times the base is used as a factor.

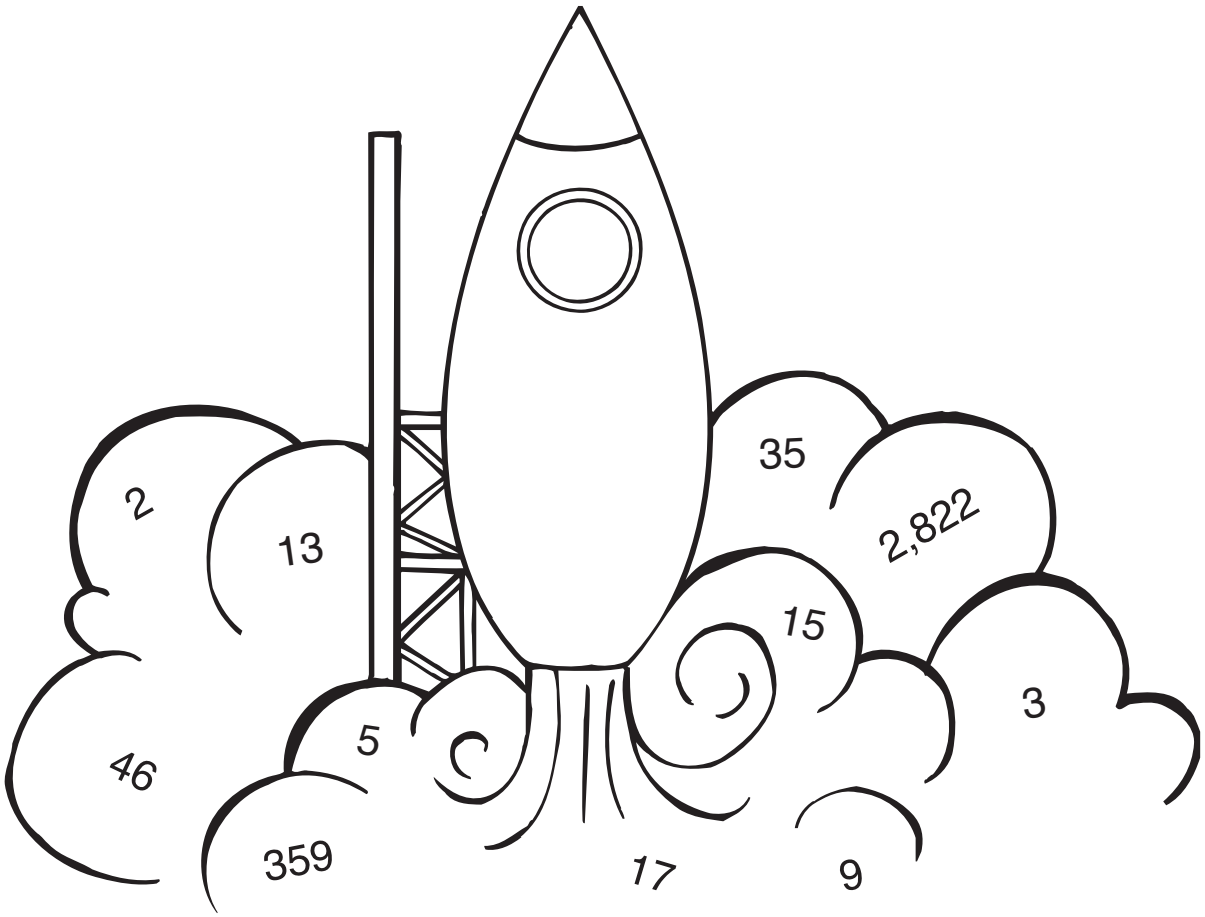
$$27^4 = 27 \times 27 \times 27 \times 27 = 531{,}441$$

Use a calculator to find the missing numbers.

1. $178^3 =$ 5,639,752
2. $35^5 =$ 52,521,875
3. $46^{\boxed{4}} = 4{,}477{,}456$
4. $13^{\boxed{6}} = 4{,}826{,}809$
5. 15,914 $= 17^2 + 25^3$
6. 31,384 $= 22^3 + 12^4$
7. $2{,}822 = 5^{\boxed{4}} + 13^3$
8. $5{,}913 = 18^3 + 9^{\boxed{2}}$

Use 2 and 3 for the exponents to make each equation true.

9. $3{,}033 = 14^{\boxed{3}} + 17^{\boxed{2}}$
10. $3{,}519 = 12^{\boxed{2}} + 15^{\boxed{3}}$



Touchdown with Integers

Name _____

Examine the following chart of a team's last four plays in the football game.

The Number of Yards Made in Each Play

First play	Second play	Third play	Fourth play
8	$^{-}4$	3	$^{-}14$

You can use properties of addition to find the net yardage gained in the four plays.

$$8 + {}^{-}4 + 3 + {}^{-}14 =$$
$$(8 + 3) + ({}^{-}4 + {}^{-}14) =$$
$$11 + {}^{-}18 = {}^{-}7$$

The team had a net loss of 7 yards.

What two math properties of addition are used in the problem above?

commutative and associative

Read the following word problems and use the math properties of addition to solve each. Write and label the answer.

1. Dr. Rogers bought shares of electric power company stock. One week the price of the stock changed as follows: Monday—up \$3.00; Tuesday—down \$3.00; Wednesday—down \$1.00; Thursday—up \$4.00. Find the net change in the stock's price for the week.

   up \$3.00

2. In Fairbanks, Alaska, the temperature rose 13 degrees between 10:00 AM and 2:00 PM During the next four hours, the temperature dropped 16 degrees because of a storm front that came into the area. In the next two hours, the temperature fell another 8 degrees. Around midnight, after the storm moved on, the temperature rose 12 degrees. What was the net change in temperature between 10:00 AM and midnight?

   up 1 degree

3. A sailing vessel left a South American port at a latitude of 26° S. The ship sailed 17° N, then 18° S, then 39° N. What was the latitude of the ship at that point of the trip?

   12° N

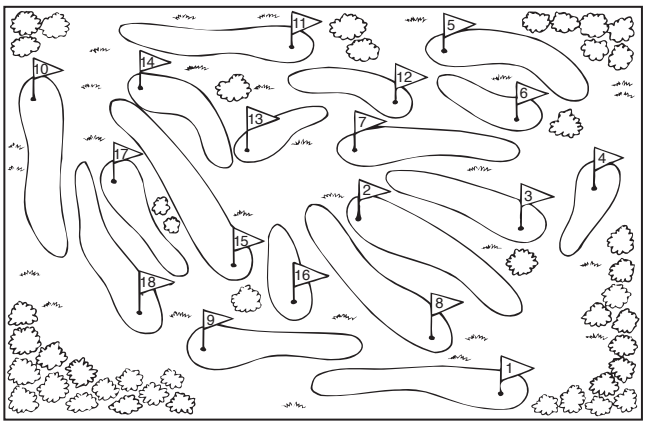
A Birdie and a Bogey

Name _____

In the game of golf, each hole has a *par*. The par is the number of strokes it should take to get the ball into the hole. A golf course has a mixture of par 3, par 4, and par 5 holes. A golf game is made up of 18 holes. The player with the lowest number of strokes wins the game.

The following terms are used in golf.

eagle	2 strokes less than par (– 2)
birdie	1 stroke less than par (– 1)
par	par (0)
bogey	1 stroke more than par (+ 1)
double bogey	2 strokes more than par (+ 2)
triple bogey	3 strokes more than par (+ 3)



Examples: Find the number of strokes.

1. Daniel shot a bogey on a par 5 hole.
   A bogey means par plus 1.
   5 + 1 = 6, so Daniel took 6 strokes to finish the hole.

2. Most tournaments use a par 72 course. On one of these courses, Mr. McLane shot 1 eagle, 5 birdies, 6 pars, 4 bogeys, and 2 double bogeys.
   Determine the values of the birdies and eagle and add this number to 72.
   $(5 \times {}^{-}1) + (1 \times {}^{-}2) = {}^{-}5 + {}^{-}2 = {}^{-}7$
   $72 + {}^{-}7 = 65$ strokes
   Then determine the values for the bogeys and double bogeys and add this number to 65.
   $(4 \times 1) + (2 \times 2) = 4 + 4 = 8$
   65 + 8 = 73 total strokes

Find the number of strokes.

1. The 8th hole is a par 4. Daniel shot an eagle. _____ 2 strokes _____
2. The 12th hole is a par 5. Mr. McLane shot a triple bogey. _____ 8 strokes _____
3. On a par 72 course, Daniel shot 1 eagle, 3 birdies, 6 pars, 4 bogeys, and 4 double bogeys.
   _____ 79 strokes _____
4. Mr. McLane had 9 pars, 3 birdies, an eagle, 4 bogeys, and a triple bogey. Mrs. McLane had 2 double bogeys, 2 eagles, 3 birdies, 3 bogeys, and 8 pars. Who won the golf game?
   _____ Mrs. McLane _____

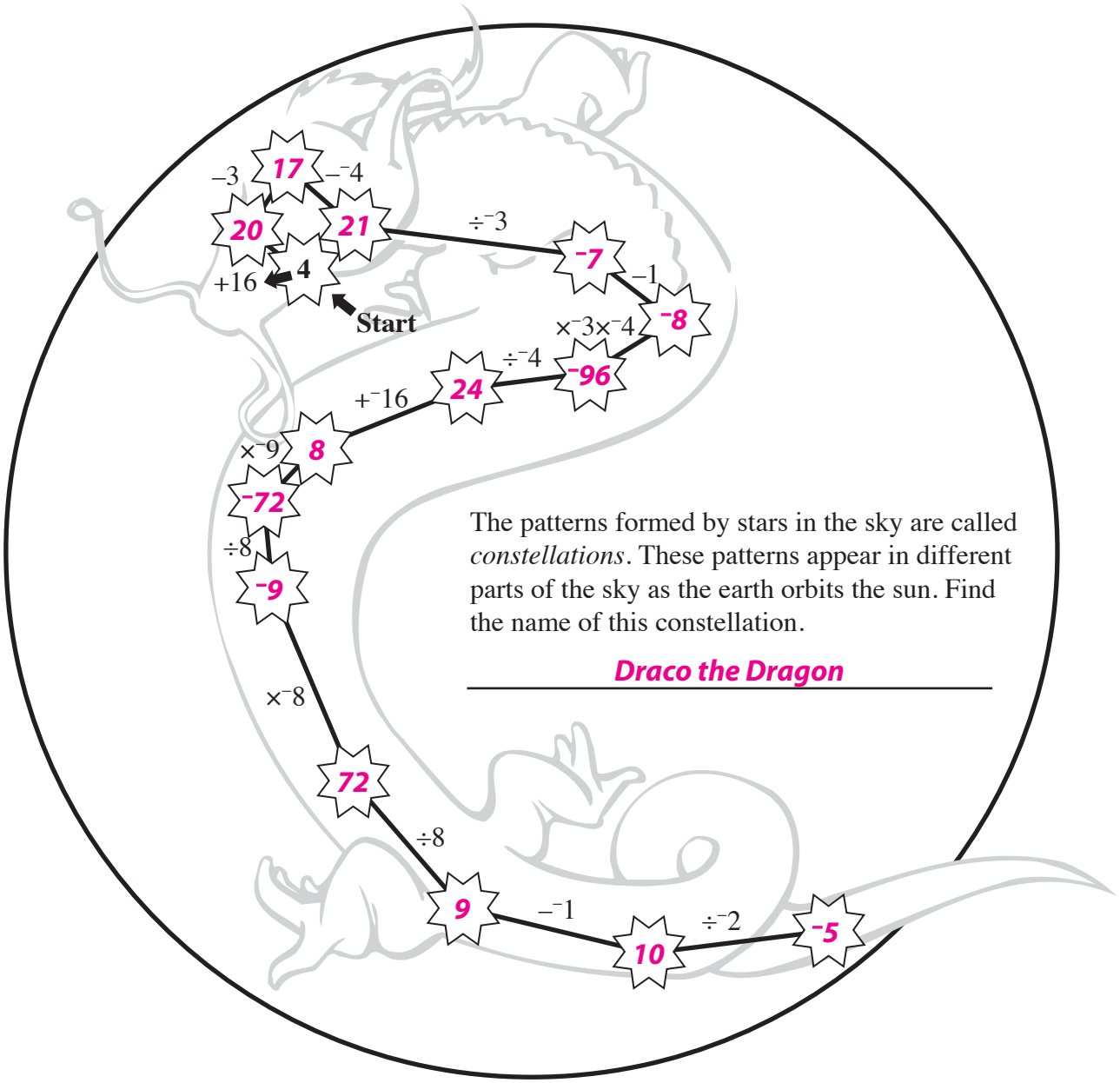
Constellation Integers

Name _____

When multiplying or dividing with negative integers, you can use a simple test to determine whether the product or quotient is positive or negative. Count the number of negative signs in the initial problem. If there is an even number of negative signs, the product or quotient is positive. If there is an odd number of negative signs, the product or quotient is negative.

Examples: $^{-}4 \times {}^{-}2 \times {}^{-}4 = {}^{-}32$
$^{-}4 \times 2 \times {}^{-}4 = 32$
$^{-}4 \times 2 \times 4 = {}^{-}32$

Start at the arrow and move from star to star, performing each mathematical operation. Write your answer in the star.



The patterns formed by stars in the sky are called *constellations*. These patterns appear in different parts of the sky as the earth orbits the sun. Find the name of this constellation.

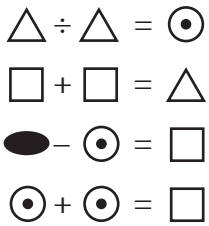
Draco the Dragon

Figuring Shapes

Name _____

Each symbol represents the same number for each set of equations. Replace each shape with a number to make each equation true. Fill in the blanks.

1. Use the numbers 1, 2, 3, and 4.



4 ÷ 4 = 1

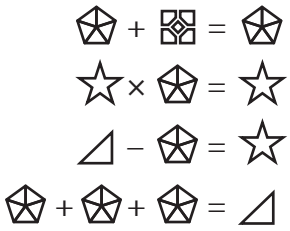
2 + 2 = 4

3 – 1 = 2

1 + 1 = 2

△ = 4 ⊙ = 1 □ = 2 ⬬ = 3

2. Use the numbers 0, 1, 2, and 3.



1 + 0 = 1

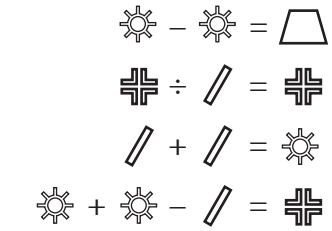
2 × 1 = 2

3 – 1 = 2

1 + 1 + 1 = 3

☆ = 2 ⬠ = 1 ◿ = 3 ▩ = 0

3. Use the numbers 0, 1, 2, and 3.



2 – 2 = 0

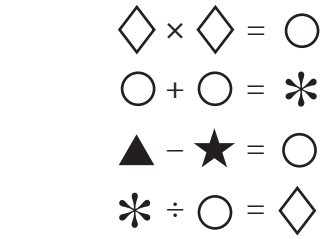
3 ÷ 1 = 3

1 + 1 = 2

2 + 2 – 1 = 3

⏢ = 0 ⌗ = 3 ☼ = 2 ⫽ = 1

4. Use the numbers 2, 4, 6, 8, and 10.



2 × 2 = 4

4 + 4 = 8

10 – 6 = 4

8 ÷ 4 = 2

✻ = 8 ★ = 6 ▲ = 10 ◇ = 2 ○ = 4

Numbers in Babylon

Name _____

The Babylonian numeration system developed between 3000 BC and 2000 BC.

- It used only two symbols.
- It used place values based on powers of 60.

In 300 BC a placeholder was invented. It acted much like our 0.

 = 1

 = 10

 = 0 (placeholder)

Place Values in Babylonian Numeration

Two Hundred Sixteen Thousands 216,000 (60 × 60 × 60)	Three Thousand, Six Hundreds 3,600 (60 × 60)	Sixties 60	Ones 1	
				= 24
				= (11 × 60) + 24 = 684
				= (21 × 3,600) + (11 × 60) + 24 = 76,284
				= (2 × 216,000) + (21 × 3,600) + (11 × 60) + 24 = 508,284

Write the value of each number.

1.  *15*

2.  *93*

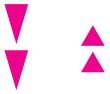
3.  *36,146*

4.  *216,621*

Write each number using the Babylonian numeration system.

5. 35 

6. 67 

7. 120 

8. 784 

9. 48,666 

10. 216,075 

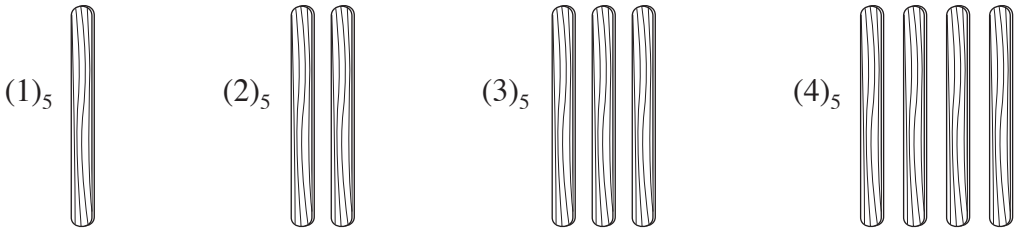
Bases: Lesson 1

Name _____

In base 10—the number system we usually use—there are ten digits.
0, 1, 2, 3, 4, 5, 6, 7, 8, 9

In the base 5 number system there are five digits.
0, 1, 2, 3, 4

Craft sticks can demonstrate how to count in base 5.
The numbers 0–4 in base 5 are the same as in base 10. They are written in the Ones place.



The place to the left of the Ones place in base 5 is the Fives place.
Study the chart.

	5 sticks		6 sticks		7 sticks		8 sticks		9 sticks	
place value	Fives	Ones	Fives	Ones	Fives	Ones	Fives	Ones	Fives	Ones
	1	0	1	1	1	2	1	3	1	4
numeral	$(10)_5$		$(11)_5$		$(12)_5$		$(13)_5$		$(14)_5$	
read	one zero, base five		one one, base five		one two, base five		one three, base five		one four, base five	

The number $(44)_5$ is the greatest number that can be made with two places in base 5 because $(44)_5 + (1)_5 = (100)_5$! Study the chart.

Twenty-fives (groups of 25)	Fives (groups of 5)	Ones
1	0	0
$(100)_5$		

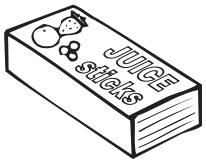
$(44)_5 = (24)_{10}$
$(100)_5 = (25)_{10}$

Read "one zero zero, base five."

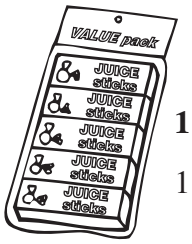
What is the next place value?

Bases: Lesson 1 (cont.) Name _____

The following illustration will also help picture how base 5 works. Study the pictures and answer the questions. Find the base 5 numerals and fill in the chart.

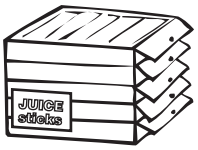


1 pack contains 5 sticks



1 multipack contains 5 packs

1 multipack = 25 sticks



1 bundle contains 5 multipacks

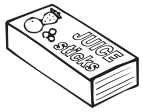
1 bundle = 25 packs

1 bundle = 125 sticks

Base 10 # of sticks	Packaging Gum	Base 5 # of sticks
$(11)_{10}$	2 packs 1 sticks	$(21)_5$
$(12)_{10}$	2 packs 2 sticks	$(22)_5$
$(13)_{10}$	2 packs 3 sticks	$(23)_5$
$(14)_{10}$	2 packs 4 sticks	$(24)_5$
$(15)_{10}$	3 packs 0 sticks	$(30)_5$
$(16)_{10}$	3 packs 1 sticks	$(31)_5$
⋮		⋮
$(25)_{10}$	1 multipacks 0 packs 0 sticks	$(100)_5$
$(26)_{10}$	1 multipacks 0 packs 1 sticks	$(101)_5$
$(27)_{10}$	1 multipacks 0 packs 2 sticks	$(102)_5$
⋮		⋮
$(32)_{10}$	1 multipacks 1 packs 2 sticks	$(112)_5$
$(33)_{10}$	1 multipacks 1 packs 3 sticks	$(113)_5$
⋮		⋮
$(124)_{10}$	4 multipacks 4 packs 4 sticks	$(444)_5$
$(125)_{10}$	1 bundles 0 multipacks 0 packs 0 sticks	$(1,000)_5$
⋮		⋮
$(148)_{10}$	1 bundles 0 multipacks 4 packs 3 sticks	$(1,043)_5$

Place Value and Translating

Since a base 5 number uses only the digits 0, 1, 2, 3, and 4, we will need place values to help understand the values of the base 5 numerals. We will look at the gum illustration again to show how the place values work.



1 pack contains 5 sticks

1 multipack contains 5 packs

1 multipack = 25 sticks

1 bundle contains 5 multipacks

1 bundle = 25 packs

1 bundle = 125 sticks

1 box contains 5 bundles

1 box = 25 multipacks

1 box = 125 packs

1 box = 625 sticks

1 shipment contains 5 boxes

1 shipment = 25 bundles

1 shipment = 125 multipacks

1 shipment = 625 packs

1 shipment = 3,125 sticks

Base 5 Place Values

Three Thousand, One Hundred Twenty-fives	Six Hundred Twenty-fives	One Hundred Twenty-fives	Twenty-fives	Fives	Ones
5 × 5 × 5 × 5 × 5	5 × 5 × 5 × 5	5 × 5 × 5	5 × 5	5	
(shipment)	(boxes)	(bundles)	(multipacks)	(packs)	(sticks)
1	0	3 ,	4	2	1

Take the numeral $(103{,}421)_5$ and interpret it using the gum illustration. (Find the total number of sticks.)

1 shipment	(three-thousand one hundred twenty-five sticks)	1 × 3,125 = 3,125 sticks
0 boxes	(six-hundred twenty-five sticks)	0 × 625 = 0 sticks
3 bundles	(one hundred twenty-five sticks)	3 × 125 = 375 sticks
4 multipacks	(twenty-five sticks each)	4 × 25 = 100 sticks
2 packs	(five sticks each)	2 × 5 = 10 sticks
1 stick		1 × 1 = + 1 sticks
TOTAL STICKS		3,611 sticks

To change a base 5 numeral to a base 10 numeral, write the base 5 numeral in expanded form and simplify.

Base 5 Place Values					
Three Thousand, One Hundred Twenty-fives	Six Hundred Twenty-fives	One Hundred Twenty-fives	Twenty-fives	Fives	Ones
5 × 5 × 5 × 5 × 5	5 × 5 × 5 × 5	5 × 5 × 5	5 × 5	5	
			3	3	4

Example: $(334)_5 = (3 \times 25) + (3 \times 5) + (4 \times 1) =$
$75 + 15 + 4 = (94)_{10}$

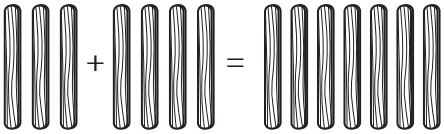
Write each base 5 numeral in expanded form and simplify in base 10.

1. $(32)_5$ = *(3 × 5) + (2 × 1)*
   15 + 2 = (*17*)$_{10}$
2. $(143)_5$ = *(1 × 25) + (4 × 5) + (3 × 1)*
   25 + 20 + 3 = (*48*)$_{10}$
3. $(421)_5$ = *(4 × 25) + (2 × 5) + (1 × 1)*
   100 + 10 + 1 = (*111*)$_{10}$
4. $(1{,}040)_5$ = *(1 × 125) + (4 × 5)*
   125 + 20 = (*145*)$_{10}$
5. $(3{,}123)_5$ = *(3 × 125) + (1 × 25) + (2 × 5) + (3 × 1)*
   375 + 25 + 10 + 3 = (*413*)$_{10}$
6. $(10{,}021)_5$ = *(1 × 625) + (2 × 5) + (1 × 1)*
   625 + 10 + 1 = (*636*)$_{10}$
7. $(21{,}234)_5$ = *(2 × 625) + (1 × 125) + (2 × 25) + (3 × 5) + (4 × 1)*
   1,250 + 125 + 50 + 15 + 4 = (*1,444*)$_{10}$
8. $(100{,}121)_5$ = *(1 × 3,125) + (1 × 25) + (2 × 5) + (1 × 1)*
   3,125 + 25 + 10 + 1 = (*3,161*)$_{10}$
9. $(210{,}341)_5$ = *(2 × 3,125) + (1 × 625) + (3 × 25) + (4 × 5) + (1 × 1)*
   6,250 + 625 + 75 + 20 + 1 = (*6,971*)$_{10}$

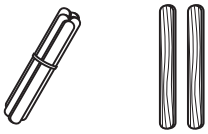
Addition

To introduce addition, we will use craft sticks. You will need 45 craft sticks and 9 rubber bands.

To represent $(3)_5 + (4)_5$, picture each numeral separately and then group them together.

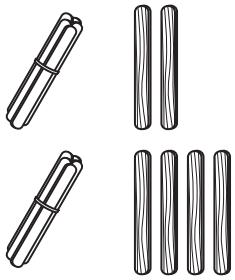


Now express the sum as a base 5 numeral by renaming the sum into groups of five.

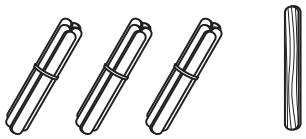


1 group of five 2 ones $(3)_5 + (4)_5 = (12)_5$

Use craft sticks to picture $(12)_5 + (14)_5$.



Now express the sum as a base 5 numeral by renaming the sum into groups of five.



3 groups of five 1 one

$(12)_5 + (14)_5 = (31)_5$

Use the craft sticks to demonstrate each addition problem and then write the sum as a base 5 numeral.

Example: $(23)_5 + (34)_5 = (\underline{112}\,)_5$

1. $(2)_5 + (4)_5 = (\underline{11}\,)_5$
2. $(4)_5 + (11)_5 = (\underline{20}\,)_5$
3. $(13)_5 + (11)_5 = (\underline{24}\,)_5$
4. $(14)_5 + (14)_5 = (\underline{33}\,)_5$
5. $(14)_5 + (22)_5 = (\underline{41}\,)_5$
6. $(23)_5 + (23)_5 = (\underline{101}\,)_5$
7. $(31)_5 + (24)_5 = (\underline{110}\,)_5$
8. $(43)_5 + (33)_5 = (\underline{131}\,)_5$

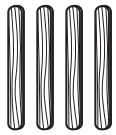
9. Try to find the sum of $(124)_5$, $(132)_5$, and $(232)_5$ without using craft sticks. (Hint: Line up the numbers vertically and add each column separately. Be careful when you rename.)

$$\begin{array}{r} (124)_5 \\ (132)_5 \\ +\,(232)_5 \\ \hline (1{,}043)_5 \end{array}$$

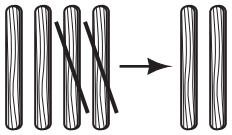
Subtraction

For this lesson on subtraction you will need 45 craft sticks and 4 rubber bands.

To represent $(4)_5 - (2)_5$, picture $(4)_5$ using craft sticks.



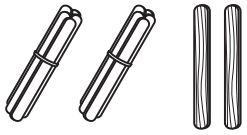
Now take away the sticks that would represent $(2)_5$.



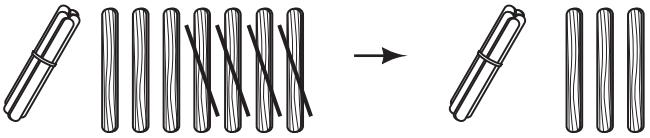
2 left

$(4)_5 - (2)_5 = (2)_5$

To represent $(22)_5 - (4)_5$, picture $(22)_5$ using craft sticks.



One group of 5 sticks is renamed as 5 ones so that there are 7 sticks in the Ones place. Now take away the sticks that would represent $(4)_5$.



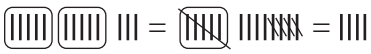
$(22)_5 - (4)_5 = (13)_5$

1 group of five and 3 ones left

Use craft sticks to solve each subtraction problem and then write the difference as a base 5 numeral.

Example: $(14)_5 - (11)_5 = (\underline{3})_5$

$(23)_5 - (14)_5 = (\underline{4})_5$



1. $(3)_5 - (1)_5 = (\underline{2})_5$
2. $(12)_5 - (3)_5 = (\underline{4})_5$
3. $(13)_5 - (4)_5 = (\underline{4})_5$
4. $(21)_5 - (3)_5 = (\underline{13})_5$
5. $(20)_5 - (13)_5 = (\underline{2})_5$
6. $(33)_5 - (14)_5 = (\underline{14})_5$
7. $(30)_5 - (23)_5 = (\underline{2})_5$
8. $(32)_5 - (31)_5 = (\underline{1})_5$
9. $(42)_5 - (24)_5 = (\underline{13})_5$
10. $(41)_5 - (33)_5 = (\underline{3})_5$

Bases: Lesson 5

Name _____

Addition and subtraction can be done without the use of craft sticks. Line up the problems vertically and solve column by column.

Addition Without Manipulatives

$(42)_5 + (33)_5 = (130)_5$

Twenty-fives	Fives	Ones
1	1 4	2
+	3	3
1	3	0

2 ones + 3 ones = 1 five and 0 ones

1 five + 4 fives + 3 fives = 1 twenty-five and 3 fives

Add.

1.

Fives	Ones
1 3	2
+	4
4	1

2.

Twenty-fives	Fives	Ones
1 2	1 1	4
+ 1	3	4
4	0	3

3.

Twenty-fives	Fives	Ones
2 1	1 4	1
1	3	3
+	3	4
4	1	3

Subtraction Without Manipulatives

$(123)_5 - (44)_5 = (24)_5$

Twenty-fives	Fives	Ones
0 ~~1~~	6 ~~2~~ 1	8 ~~3~~
–	4	4
	2	4

1 five needs to be renamed as 5 ones. 5 ones + 3 ones = 8 ones

1 twenty-five needs to be renamed as 5 fives. 5 fives + 1 five = 6 fives

Subtract.

4.

Fives	Ones
~~2~~ 1	~~3~~ 8
– 1	4
	4

5.

Twenty-fives	Fives	Ones
~~1~~ 0	8 ~~4~~ 3	~~2~~ 7
–	4	3
	4	4

6.

One Hundred Twenty-fives	Twenty-fives	Fives	Ones
~~4~~ 3	~~1~~ 6	4	4
– 2	3	2	1
1	3	2	3

Bases: Lesson 6

Name _____

Base 6 is a number system that uses the six digits 0, 1, 2, 3, 4, and 5.

Complete the chart that shows counting in base 6.

	Base 10	Base 6
	$(1)_{10}$	$(1)_6$
	$(2)_{10}$	$(2)_6$
	$(3)_{10}$	$(3)_6$
	$(4)_{10}$	$(4)_6$
	$(5)_{10}$	$(5)_6$
	$(6)_{10}$	$(10)_6$
	$(7)_{10}$	$(11)_6$
1.	$(8)_{10}$	$(\_12\_)_6$
2.	$(9)_{10}$	$(\_13\_)_6$
3.	$(10)_{10}$	$(\_14\_)_6$
4.	$(11)_{10}$	$(\_15\_)_6$
5.	$(12)_{10}$	$(\_20\_)_6$
6.	$(13)_{10}$	$(\_21\_)_6$
7.	$(14)_{10}$	$(\_22\_)_6$
8.	$(15)_{10}$	$(\_23\_)_6$
9.	$(16)_{10}$	$(\_24\_)_6$
10.	$(17)_{10}$	$(\_25\_)_6$
11.	$(18)_{10}$	$(\_30\_)_6$
12.	$(19)_{10}$	$(\_31\_)_6$
13.	$(20)_{10}$	$(\_32\_)_6$
14.	$(21)_{10}$	$(\_33\_)_6$
15.	$(22)_{10}$	$(\_34\_)_6$
16.	$(23)_{10}$	$(\_35\_)_6$
17.	$(24)_{10}$	$(\_40\_)_6$

Base 6 Place Values

Seven Thousand, Seven Hundred Seventy-sixes	One Thousand, Two Hundred Ninety-sixes	Two Hundred Sixteens	Thirty-sixes	Sixes	Ones
$6 \times 6 \times 6 \times 6 \times 6 \times 6$	$6 \times 6 \times 6 \times 6 \times 6$	$6 \times 6 \times 6$	6×6	6	

Write each base 6 numeral in expanded form and simplify in base 10.

Example: $(125)_6 = (1 \times 36) + (2 \times 6) + (5 \times 1) =$
$36 + 12 + 5 = (53)_{10}$

18. $(3{,}014)_6 =$ $(3 \times 216) + (1 \times 6) + (4 \times 1)$
$648 + 6 + 4 = (658)_{10}$

19. $(12{,}503)_6 =$ $(1 \times 1{,}296) + (2 \times 216) + (5 \times 36) + (3 \times 1)$
$1{,}296 + 432 + 180 + 3 = (1{,}911)_{10}$

20. $(45{,}123)_6 =$ $(4 \times 1{,}296) + (5 \times 216) + (1 \times 36) + (2 \times 6) + (3 \times 1)$
$5{,}184 + 1{,}080 + 36 + 12 + 3 =$
$(6{,}315)_{10}$

Add. Use craft sticks in groups of 6 if needed.

21. $(3)_6 + (5)_6 = (\_12\_)_6$

22. $(13)_6 + (13)_6 = (\_30\_)_6$

23. $(12)_6 + (4)_6 = (\_20\_)_6$

24. $(24)_6 + (32)_6 = (\_100\_)_6$

Subtract. Use craft sticks in groups of 6 if needed.

25. $(14)_6 - (5)_6 = (\_5\_)_6$

26. $(30)_6 - (12)_6 = (\_14\_)_6$

27. $(23)_6 - (15)_6 = (\_4\_)_6$

28. $(51)_6 - (45)_6 = (\_2\_)_6$

Base 12

Base 12 is a number system that uses 12 digits: zero through nine along with an *A* (which has a value of 10) and a *B* (which has a value of 11). To illustrate base 12, we will use a dozen and a gross (12 dozen).

Base 10	Doughnuts	Base 12
$(1)_{10}$	1 doughnut	$(1)_{12}$
$(2)_{10}$	2 doughnuts	$(2)_{12}$
⋮	⋮	⋮
$(9)_{10}$	9 doughnuts	$(9)_{12}$
$(10)_{10}$	10 doughnuts	$(A)_{12}$
$(11)_{10}$	11 doughnuts	$(B)_{12}$
$(12)_{10}$	1 dozen + 0 doughnuts	$(10)_{12}$
$(13)_{10}$	1 dozen + 1 doughnut	$(11)_{12}$
$(14)_{10}$	1 dozen + 2 doughnuts	$(12)_{12}$
$(15)_{10}$	1 dozen + 3 doughnuts	$(13)_{12}$
$(16)_{10}$	1 dozen + 4 doughnuts	$(14)_{12}$
$(17)_{10}$	1 dozen + 5 doughnuts	$(15)_{12}$
$(18)_{10}$	1 dozen + 6 doughnuts	$(16)_{12}$
$(19)_{10}$	1 dozen + 7 doughnuts	$(17)_{12}$
$(20)_{10}$	1 dozen + 8 doughnuts	$(18)_{12}$
$(21)_{10}$	1 dozen + 9 doughnuts	$(19)_{12}$
$(22)_{10}$	1 dozen + 10 or A doughnuts	$(1A)_{12}$
$(23)_{10}$	1 dozen + 11 or B doughnuts	$(1B)_{12}$
$(24)_{10}$	2 dozen + 0 doughnuts	$(20)_{12}$
$(25)_{10}$	2 dozen + 1 doughnuts	$(21)_{12}$
$(26)_{10}$	2 dozen + 2 doughnuts	$(22)_{12}$
⋮	⋮	⋮
$(144)_{10}$	1 gross + 0 dozen + 0 doughnuts	$(100)_{12}$

Base 12 Place Values				
Twenty Thousand, Seven Hundred Thirty-sixes	One Thousand, Seven Hundred Twenty-eights	One Hundred Forty-fours	Twelves	Ones
12 × 12 × 12 × 12	12 × 12 × 12	12 × 12	12	

To change base 12 numerals to base 10, write the numeral in expanded form and simplify.

Write each base 12 number in expanded form and simplify in base 10.

Example: $(12B)_{12} = (1 \times 144) + (2 \times 12) + (11 \times 1) =$
$144 + 24 + 11 = (179)_{10}$

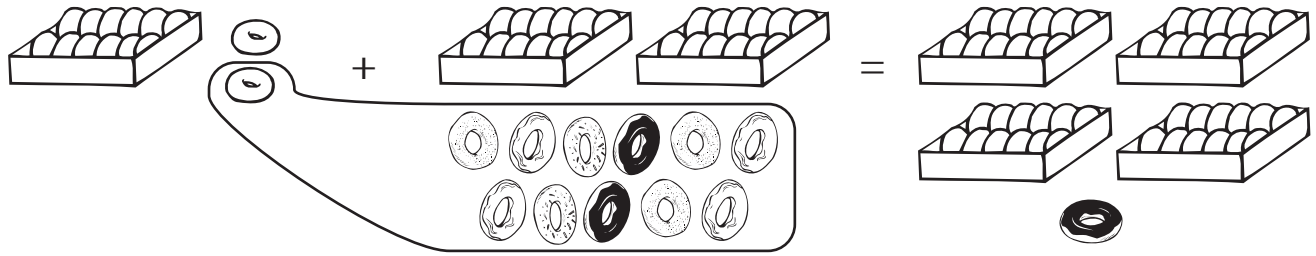
1. $(4{,}917)_{12} =$ *(4 × 1,728) + (9 × 144) + (1 × 12) + (7 × 1)*
6,912 + 1,296 + 12 + 7 = (8,227)$_{10}$

2. $(7{,}A2B)_{12} =$ *(7 × 1,728) + (10 × 144) + (2 × 12) + (11 × 1)*
12,096 + 1,440 + 24 + 11 = (13,571)$_{10}$

Addition in Base 12

$(12)_{12}$ + $(2B)_{12}$ = $(41)_{12}$

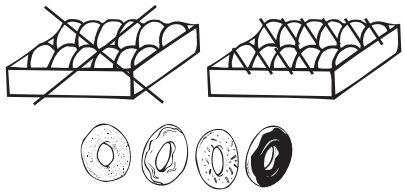
1 twelve (dozen) 2 ones (doughnuts) + 2 twelves (dozens) 11 ones (doughnuts) = 4 twelves (dozens) 1 one (doughnut)



Subtraction in Base 12

$(24)_{12}$ – $(1A)_{12}$ = $(6)_{12}$

2 twelves (dozens) 4 ones (doughnuts) – 1 twelve 10 ones (doughnuts) = 6 ones (doughnuts)



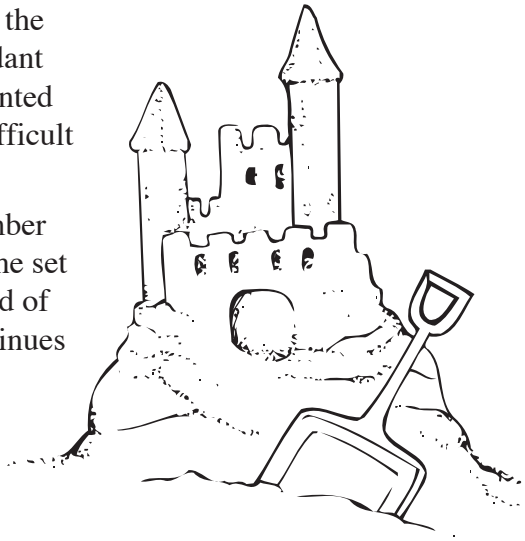
Add or subtract.

3. $(12)_{12} + (56)_{12} = (\underline{68})_{12}$
4. $(45)_{12} - (19)_{12} = (\underline{28})_{12}$
5. $(2B)_{12} + (A)_{12} = (\underline{39})_{12}$
6. $(9A)_{12} - (2B)_{12} = (\underline{6B})_{12}$
7. $(45)_{12} + (BA)_{12} = (\underline{143})_{12}$
8. $(58)_{12} - (4A)_{12} = (\underline{A})_{12}$

Finite and Infinite

Name _____

Can you count all of the grains of sand in the world? You could if you had enough patience and time. Some sets, like the set of all the grains of sand, are so large that they are considered super abundant finite sets. A finite set is a set in which the members can be counted or listed even though that number may be very large or seem difficult to determine.



An infinite set is ongoing because there is not a limit to the number of elements contained in the set. If you list all the members of the set of counting or natural numbers (N), you will never reach the end of the list. Sometimes three dots are used to show that the list continues without end.

$$N = \{1, 2, 3, 4, 5, 6, \ldots\}$$

Tell whether each set is finite or infinite.

1. {trees on the earth} _____Finite_____
2. {all the apple seeds in the world} _____Finite_____
3. $\{1, 3, 5, 7, 9, \ldots\}$ _____Infinite_____
4. {students in sixth grade} _____Finite_____
5. {odd numbers greater than one million} _____Infinite_____
6. $\{1, 2, 3, 4, \ldots 21\}$ _____Finite_____
7. $\{0, 1, {}^{-}1, 2, {}^{-}2, 3, {}^{-}3, 4, {}^{-}4, \ldots\}$ _____Infinite_____

If the set is infinite, write *infinite.* If the set is finite, write the number of elements in the set.

8. {ears on a rabbit} _____2_____
9. $\{0, 1, 2, 3, \ldots 300\}$ _____301_____
10. {set of points on a circle} _____Infinite_____

Write four sets and tell whether they are finite or infinite. *Answers will vary.*

11. _____
12. _____
13. _____
14. _____

Fill in the blank.

Always remember—God's love is _____Infinite_____.

Mental Math: Fractions

Name _____

These methods will help you solve fraction problems mentally.

* To multiply a whole number times a mixed number, think . . .

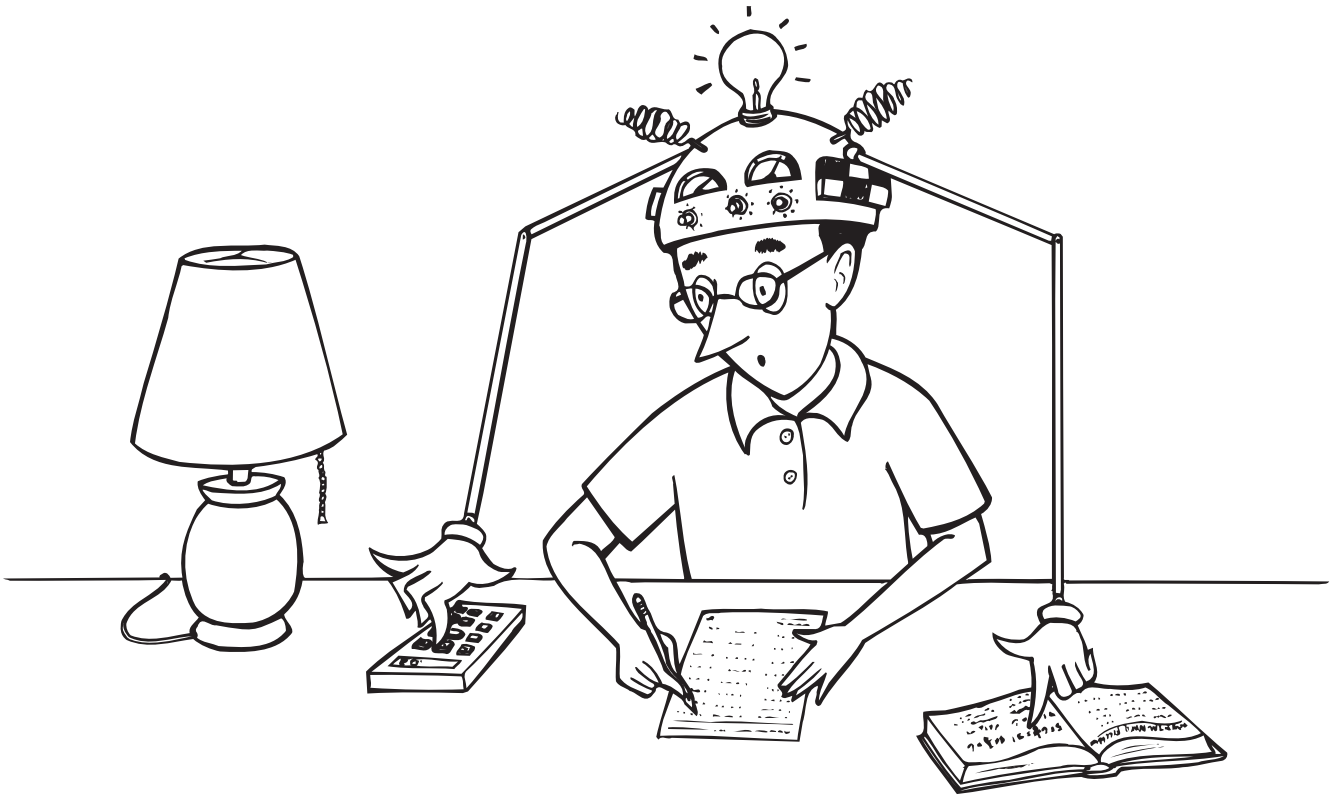
$6 \times 4\frac{1}{2} = (6 \times 4) + (6 \times \frac{1}{2})$
$24 + 3 = 27$

* To multiply a fraction times a whole number, think . . .

$\frac{2}{3} \times 15 = (\frac{1}{3} \times 15) + (\frac{1}{3} \times 15)$
$5 + 5 = 10$

Mental Math: Write only the answer.

1. $5 \times 6\frac{1}{5} =$ *31*
2. $8 \times \frac{3}{4} =$ *6*
3. $2\frac{1}{2} \times 12 =$ *30*
4. $\frac{3}{4} \times 12 =$ *9*
5. $7 \times 2\frac{1}{7} =$ *15*
6. $4 \times 3\frac{1}{2} =$ *14*
7. $8 \times 7\frac{1}{4} =$ *58*
8. $12 \times 3\frac{1}{6} =$ *38*
9. $\frac{6}{10} \times 50 =$ *30*
10. $\frac{7}{12} \times 36 =$ *21*
11. $\frac{3}{8} \times 24 =$ *9*
12. $10 \times 5\frac{1}{2} =$ *55*
13. $9 \times 5\frac{1}{3} =$ *48*
14. $5 \times 7\frac{1}{5} =$ *36*
15. $\frac{2}{7} \times 28 =$ *8*
16. $\frac{5}{9} \times 27 =$ *15*
17. $6 \times 3\frac{1}{3} =$ *20*
18. $\frac{6}{11} \times 77 =$ *42*



Living with Fractions

Name _____

Write the equations for the word problems. Solve the problems on a separate sheet of paper. Write and label the answer. *Problem-solving strategy will vary.*

1. Mr. and Mrs. Paraná are missionaries. They have been married 20 years. They have spent $\frac{3}{4}$ of their marriage as missionaries in Nicaragua. How long have they been in Nicaragua?

   $\frac{3}{4} \times 20 = 15$ years

2. Mr. Foster operated Christian radio stations in various countries for 24 years. He spent $\frac{1}{4}$ of his time in Panama, $\frac{5}{8}$ of his time in Jamaica, and the rest of his time in Mexico City. How long was he in Mexico City?

   $\frac{1}{4} + \frac{5}{8} = \frac{7}{8}$; $\frac{7}{8} \times 24 = 21$; $24 - 21 = 3$ years

3. Anne read that the world's population in 1994 was about 5.6 billion. About $\frac{1}{12}$ of the people lived in North America, and $\frac{1}{16}$ of the people lived in South America. About how many people lived in North America and South America?

   $(\frac{1}{12} \times 5.6) + (\frac{1}{16} \times 5.6) = 0.467 + 0.35 = 0.817$ billion; 817 million people

4. A church in Rhode Island sent a special offering to the Paranás to be used in the church school. The church specified that $\frac{3}{5}$ of the money was to be used for teacher supplies. One-fourth of the remaining money was to be used for a computer. What fraction of the total offering was put toward the purchase of a computer?

   $\frac{1}{4}$ of $\frac{2}{5} = \frac{1}{10}$ of total

5. The Rhode Island church's check was for $2,395.00. What was the amount spent on each category?

teacher supplies:	*$\frac{3}{5} \times \$2,395 = \$1,437$*
computer:	*$\frac{1}{10} \times \$2,395 = \$239.50$*
other:	*$718.50*

6. Dr. and Mrs. Aguilar are missionaries in Brazil. They raised $45,000.00 for the building fund. One-eighth of the money was paid to the contractor to begin building. How much was the contractor paid?

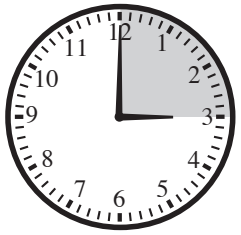
   $\frac{1}{8}$ of $45,000 = $5,625

Time for Angles

Name _____

Use the following steps to find the angle measure between the hands of a clock.

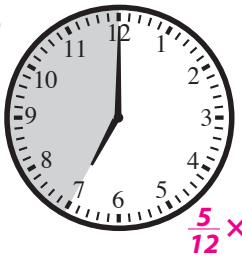
1. Determine what fraction of the clock is included between the hour and minute hands. Do this by counting the hour marks between the two hands and expressing the distance as a fraction.
2. Multiply the fraction you found in step 1 by the number of degrees in a circle. This answer is the angle measurement.



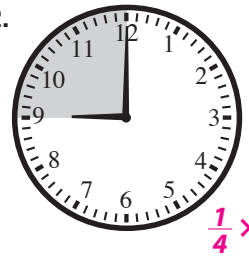
$\frac{3}{12} = \frac{1}{4}$

$\frac{1}{4} \times 360° = 90°$

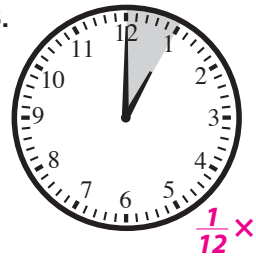
Find the angle measurement between the hands of each of the clocks below.

1. 

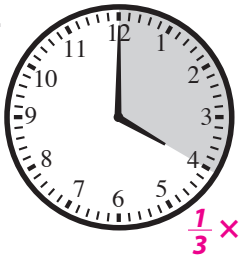
   $\frac{5}{12} \times 360° = 150°$

2. 

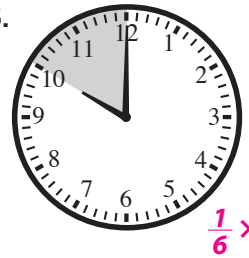
   $\frac{1}{4} \times 360° = 90°$

3. 

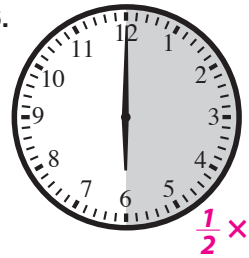
   $\frac{1}{12} \times 360° = 30°$

4. 

   $\frac{1}{3} \times 360° = 120°$

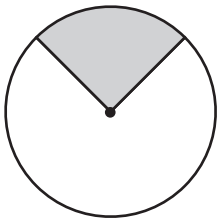
5. 

   $\frac{1}{6} \times 360° = 60°$

6. 

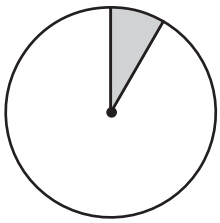
   $\frac{1}{2} \times 360° = 180°$

Estimate the shaded fraction of each circle below and the angle measurement.

7. 

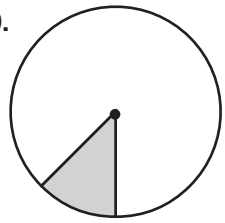
   $\frac{1}{4}$

   90°

8. 

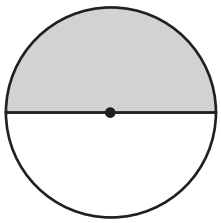
   $\frac{1}{12}$

   30°

9. 

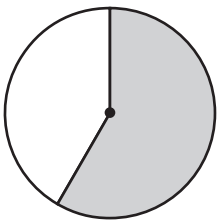
   $\frac{1}{8}$

   45°

10. 

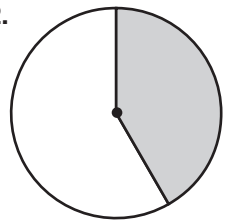
    $\frac{1}{2}$

    180°

11. 

    $\frac{7}{12}$

    210°

12. 

    $\frac{5}{12}$

    150°

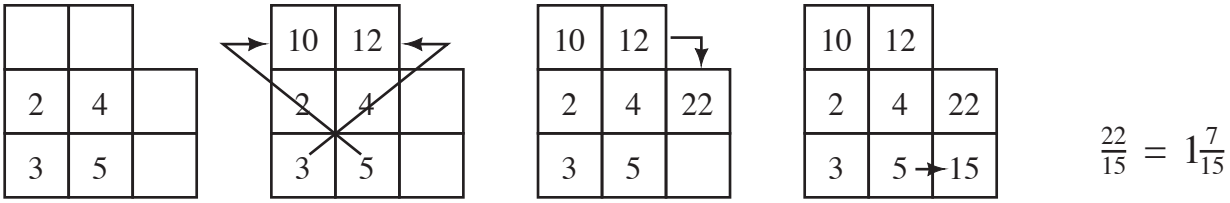
A New Way

Name _____

Here is a new way to add and subtract fractions.

1. Write the fractions in the chart as shown.
2. Cross-multiply.
3. Add or subtract as needed.
4. Multiply the denominators.
5. Simplify.

Example: $\frac{2}{3} + \frac{4}{5} =$



Step 1 Step 2 Step 3 Step 4

Step 5: $\frac{22}{15} = 1\frac{7}{15}$

Use the new method to solve each problem. (Remember to subtract instead of add in step 3 as needed.)

1. $\frac{4}{15} + \frac{3}{12} =$ *31/60*

48	*45*	
4	*3*	*93*
15	*12*	*180*

2. $\frac{4}{5} - \frac{1}{3} =$ *7/15*

12	*5*	
4	*1*	*7*
5	*3*	*15*

3. $\frac{9}{10} + \frac{6}{19} =$ *1 41/190*

171	*60*	
9	*6*	*231*
10	*19*	*190*

4. $\frac{7}{21} - \frac{2}{10} =$ *2/15*

70	*42*	
7	*2*	*28*
21	*10*	*210*

5. $\frac{1}{3} + \frac{11}{12} =$ *1 1/4*

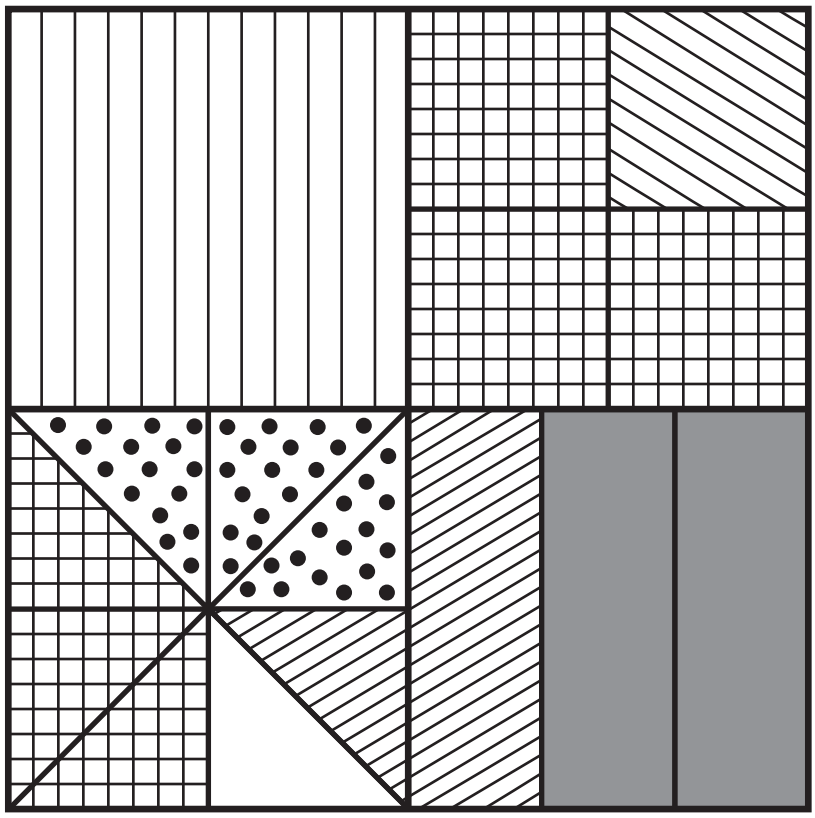
12	*33*	
1	*11*	*45*
3	*12*	*36*

6. $\frac{7}{10} - \frac{7}{18} =$ *14/45*

126	*70*	
7	*7*	*56*
10	*18*	*180*

Fractions by Design

Name _____



Example:

 = $\frac{1}{4}$ of $\frac{1}{4}$ of the large square

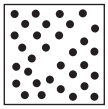
 = $\frac{1}{4} \times \frac{1}{4}$

 = $\frac{1}{16}$

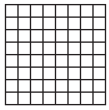
Find the fractional part represented by each pattern in the large square above. (Large square = 1 whole unit.) Your teacher may allow you to use a calculator. (Hint: the large square is divided into 4 smaller squares.)

1.  = $\frac{1}{6}$

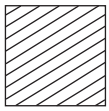
   $\frac{2}{3} \times \frac{1}{4} = \frac{1}{6}$

2.  = $\frac{3}{32}$

   $\frac{3}{8} \times \frac{1}{4} = \frac{3}{32}$

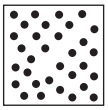
3.  = $\frac{9}{32}$

   $(\frac{3}{4} \times \frac{1}{4}) + (\frac{3}{8} \times \frac{1}{4}) = \frac{9}{32}$

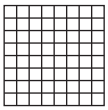
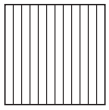
4.  = $\frac{11}{96}$

   $(\frac{1}{3} \times \frac{1}{4}) + (\frac{1}{8} \times \frac{1}{4}) = \frac{11}{96}$

Solve the problems.

5.  +  = $\frac{25}{96}$

   $\frac{1}{6} + \frac{3}{32} = \frac{25}{96}$

6.  −  = $\frac{1}{32}$

   $\frac{9}{32} - \frac{1}{4} = \frac{1}{32}$

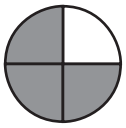
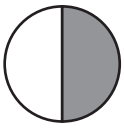
Circle Match

Name _____

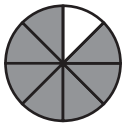
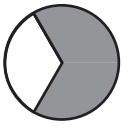
Write an equation to correspond with each pair of circles. Solve the problems. In the blank write the letter of the circle that corresponds to the product.

Answers shown based on cancellation.

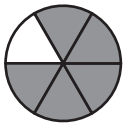
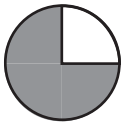
Example:

 of 

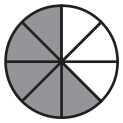
$\frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$ e

1.  of 

$\frac{7}{8} \times \frac{4}{6} = \frac{7}{12}$ a

2.  of 

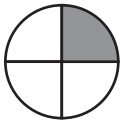
$\frac{5}{6} \times \frac{3}{4} = \frac{5}{8}$ g

3.  of 

$\frac{5}{8} \times \frac{4}{5} = \frac{1}{2}$ d

4.  of 

$\frac{3}{8} \times \frac{1}{3} = \frac{1}{8}$ b

5.  of 

$\frac{1}{4} \times \frac{2}{3} = \frac{1}{6}$ f

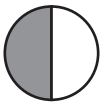
6.  of 

$\frac{1}{3} \times \frac{5}{6} = \frac{5}{18}$ c

a. 

b. 

c. 

d. 

e. 

f. 

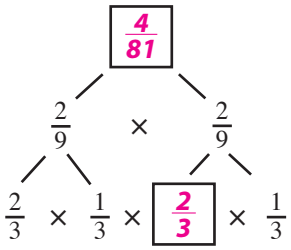
g. 

Trees of Fractions

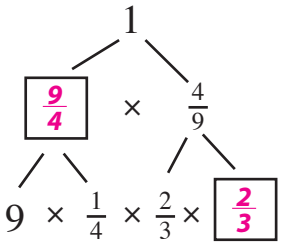
Name _____

Fill in each square with the missing fraction (proper or improper) or whole number.

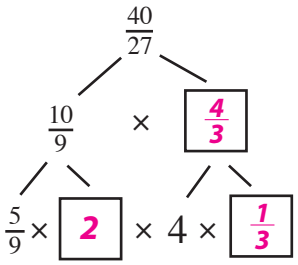
1.



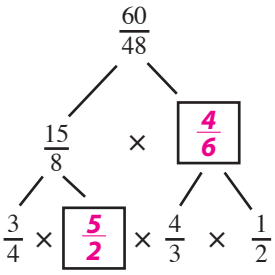
2.



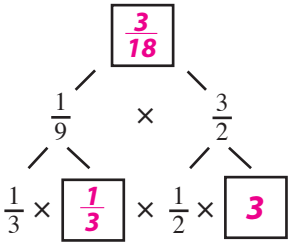
3.



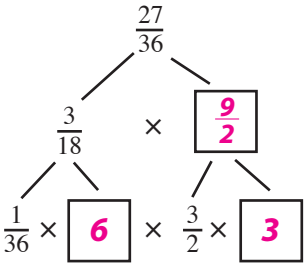
4.



5.

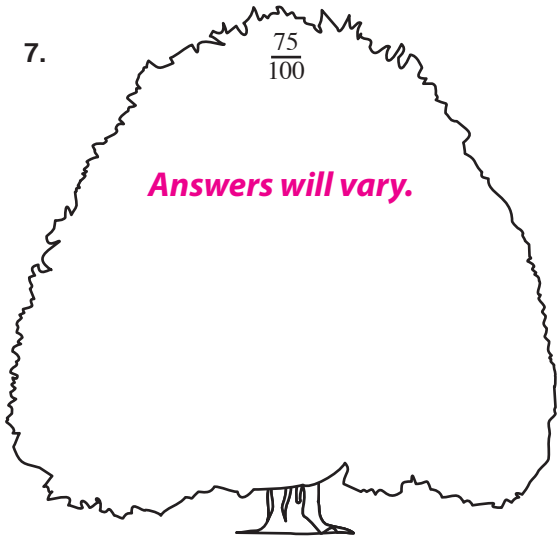


6.

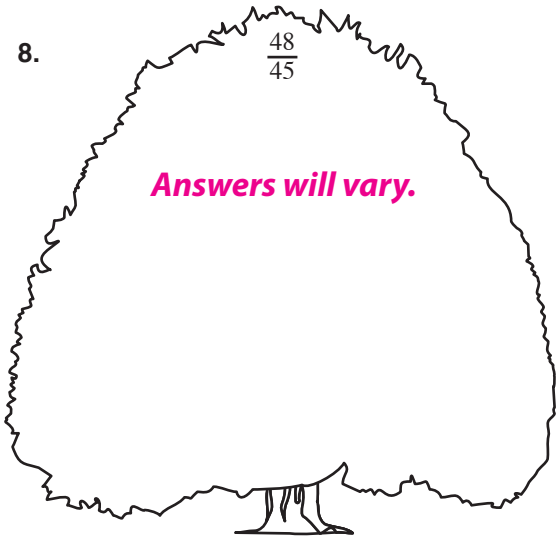


Make your own fraction factor tree for each fraction.

7.



8.

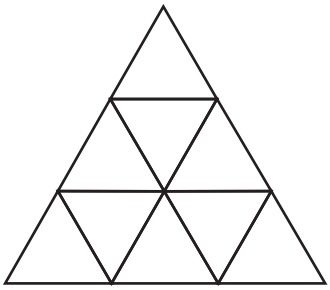


Squares and Triangles

Name _____

1. How many triangles of any size are in this figure?

   _____13_____ triangles

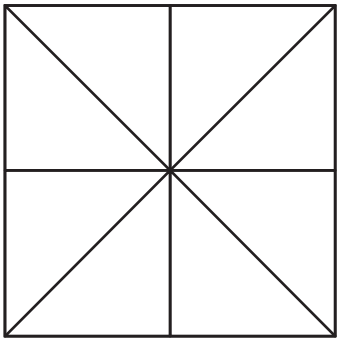


2. How many triangles of any size are in this figure?

   _____16_____ triangles

3. How many squares of any size are in this figure?

   _____5_____ squares

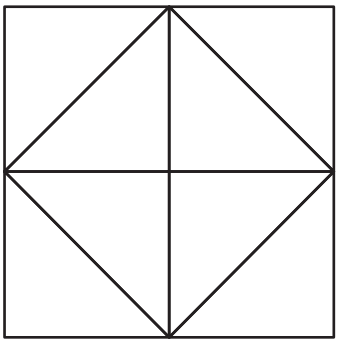


4. How many triangles of any size are in this figure?

   _____12_____ triangles

5. How many squares of any size are in this figure?

   _____6_____ squares



True or False

Name _____

Write *true* or *false* in the blank for each statement. If the statement is false, draw a triangle that demonstrates why it is false.

True — **1.** An equilateral triangle is always an isosceles triangle.

False  **2.** An acute triangle is never an isosceles triangle.

True — **3.** An equilateral triangle is always an acute triangle.

False  **4.** An isosceles triangle is never a right triangle.

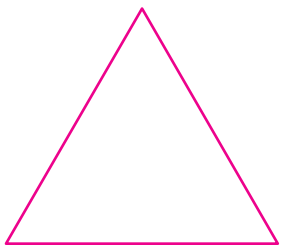
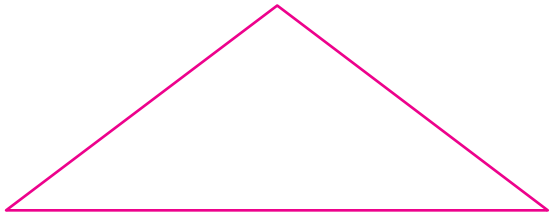
True — **5.** An obtuse triangle is never an equilateral triangle.

False  **6.** A right triangle is always a scalene triangle.

False  **7.** A scalene triangle is never a right triangle.

True — **8.** A right triangle is never an equilateral triangle.

Read the following statements. If the statement is possible, draw a figure according to the instructions. If the statement is not possible, draw an *X* in the box.

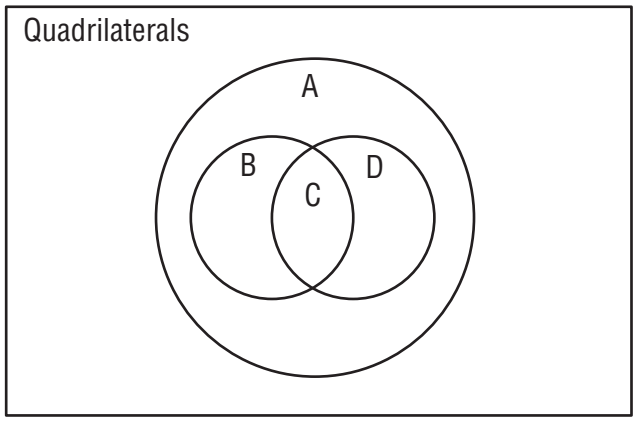
9. Draw an equilateral isosceles triangle. 	**10.** Draw a triangle with more than one obtuse angle. 
11. Draw an equilateral right triangle. 	**12.** Draw an obtuse isosceles triangle. 

Quadrilaterals

Name _____

Study the diagram below using what you know about quadrilaterals. Fill in each line with one of the terms in the word bank that will make the diagram true.

rectangle	square	rhombus	parallelogram



1. A *parallelogram*
2. B *rectangle or rhombus*
3. C *square*
4. D *rhombus or rectangle*

Write *true* or *false* in the blank for each statement. Write a sentence explaining why the statement is true or false. *Statements may vary.*

5. *False* All parallelograms are rhombuses.

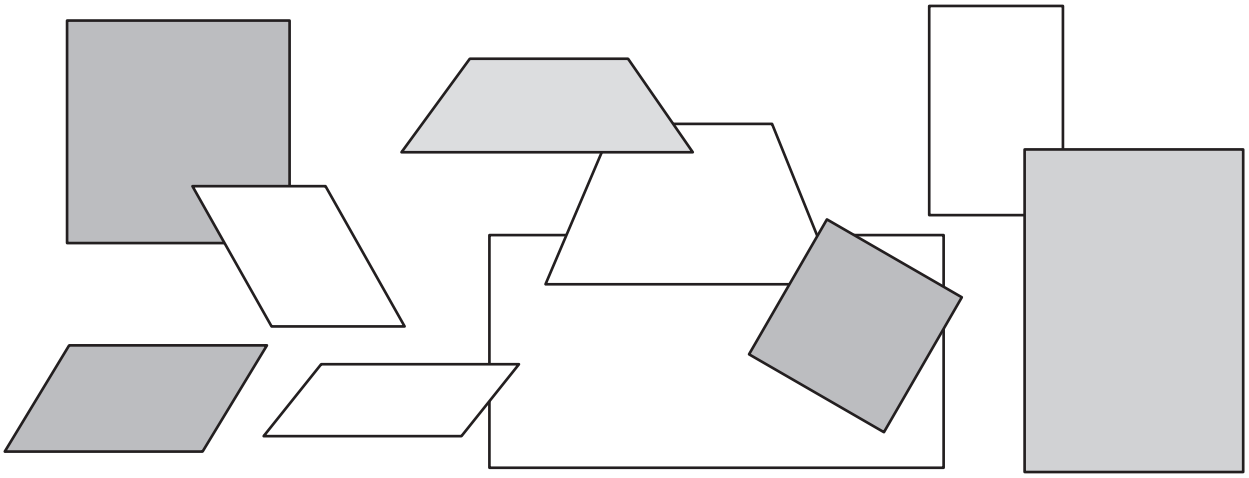
   Not all parallelograms have congruent sides.

6. *True* All rectangles are parallelograms.

   All rectangles have opposite sides that are parallel.

7. *False* All rhombuses are squares.

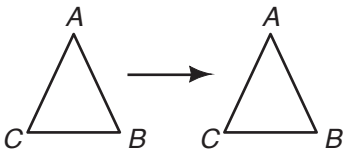
   Not all rhombuses have 4 right angles.



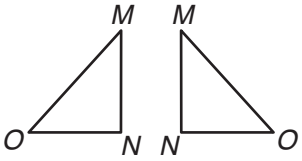
Slides, Flips, and Turns

Name _____

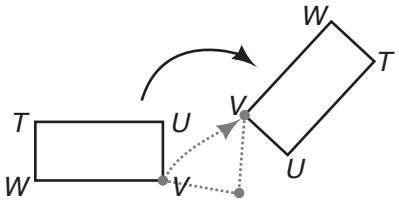
Congruent figures have exactly the same size and shape.
Congruent figures can show slides, flips, and turns.



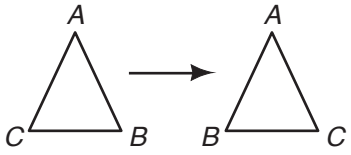
slide



flip



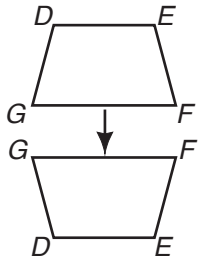
turn



This triangle was slid and flipped.

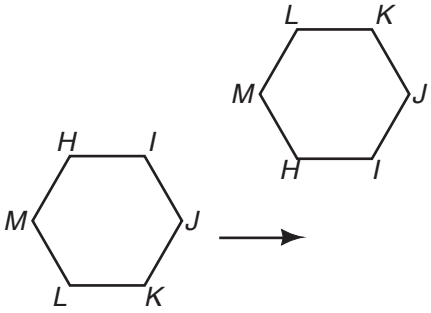
Tell the combination of actions performed on each figure.

1.



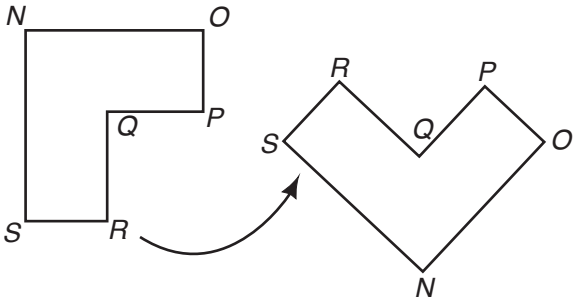
slide and *flip*

2.



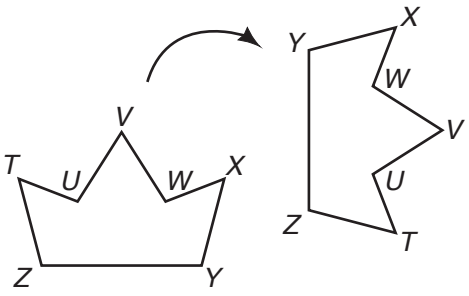
slide and *flip*

3.



flip and *turn*

4.



turn and *flip*

5. Draw a figure of your own. Slide and flip or turn and flip your figure. See if a friend can tell the combination of actions performed on your figure.

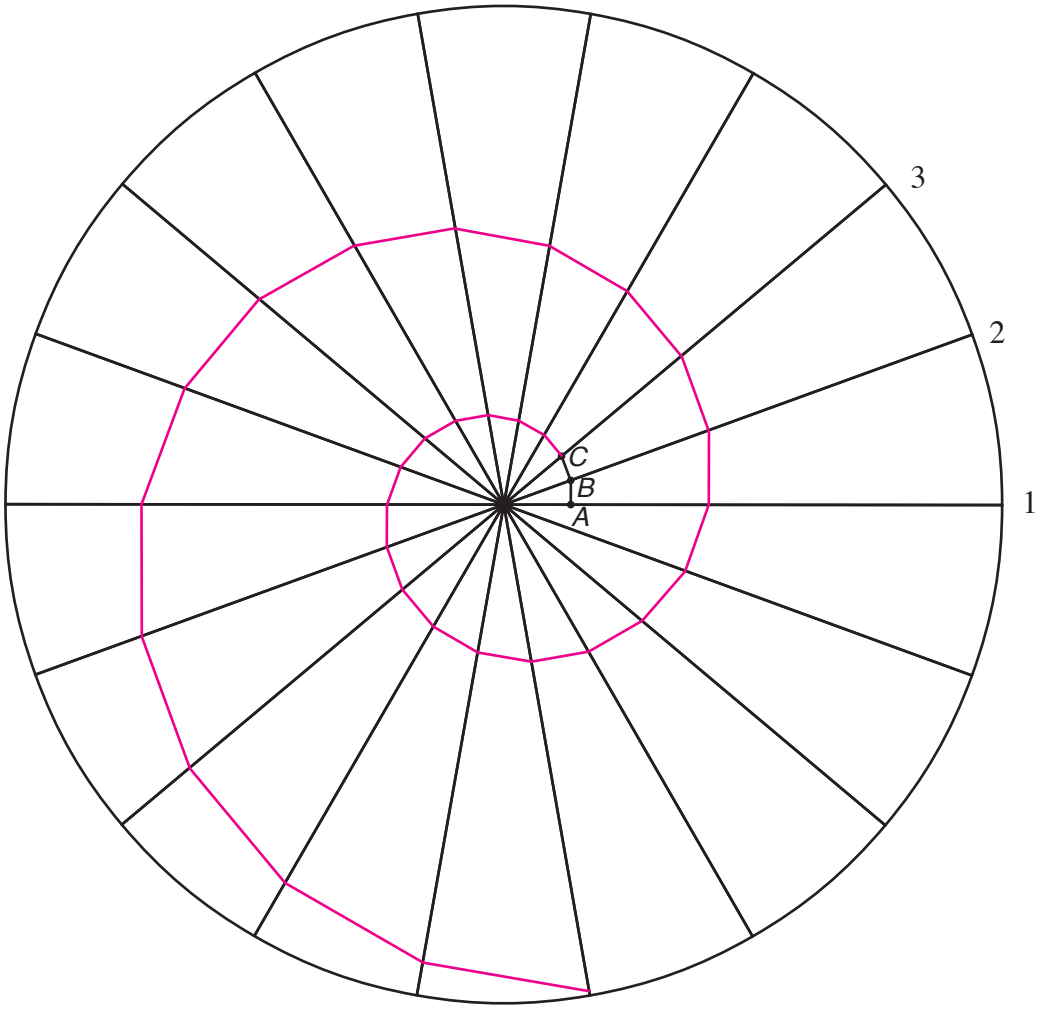
Spiraling Lines

Name _____

Spirals can be found in tiny animals and enormous galaxies. You can use a circle and perpendicular lines to form a spiral.

Follow the steps to draw a spiral on the circle below.

1. Draw a line perpendicular to radius 1 from point *A* until it reaches radius 2 (point *B*).
2. Draw a line perpendicular to radius 2 from point *B* until it reaches radius 3 (point *C*).
3. Continue the pattern on each radius until you reach the outside of the circular region.



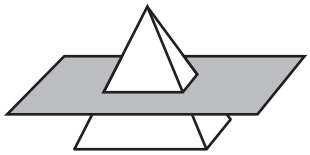
Experiment with different circles and different distances between the radii.

If you want a tighter spiral, will you need to draw the radii closer together or farther apart? ***closer together***

Cross Sections

Name _____

If you slice through a solid, the new face that results from the slice is called a *cross section*.

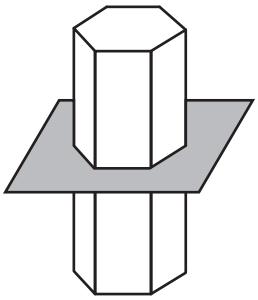


Slice the end off a rectangular pyramid.

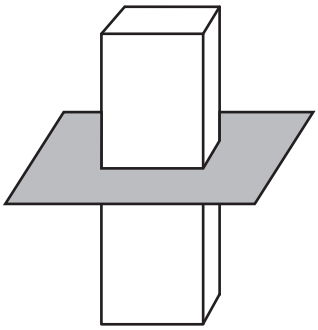
Draw a picture of the surface made by the slice. This is the cross section.

Draw a picture of each cross section.

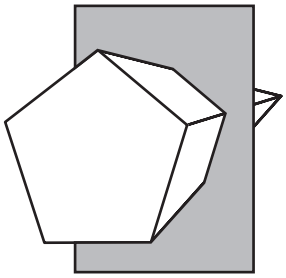
1.

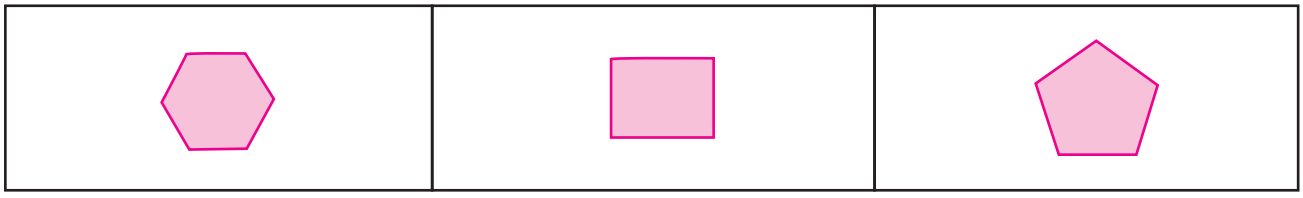


2.

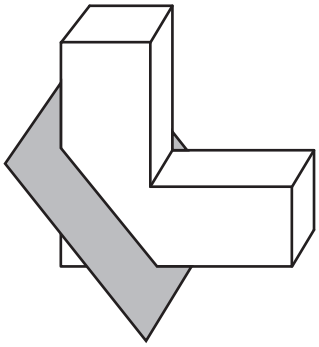


3.

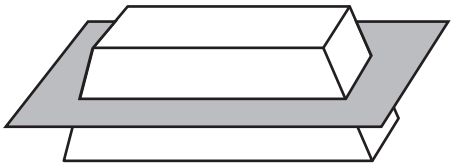




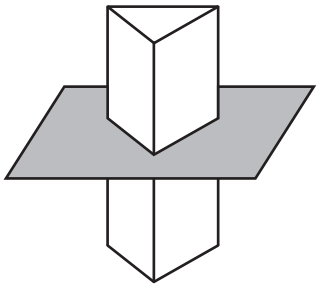
4.

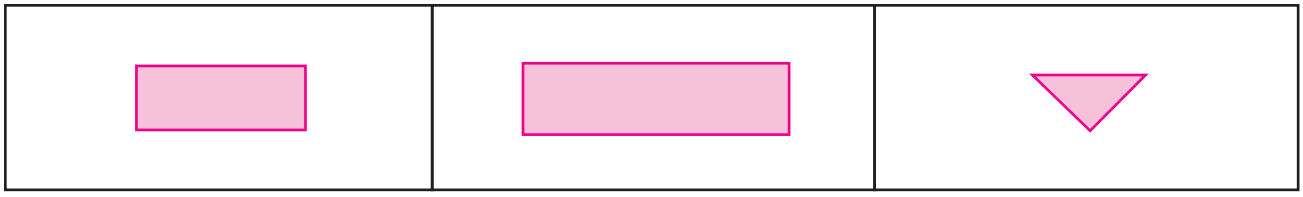


5.



6.

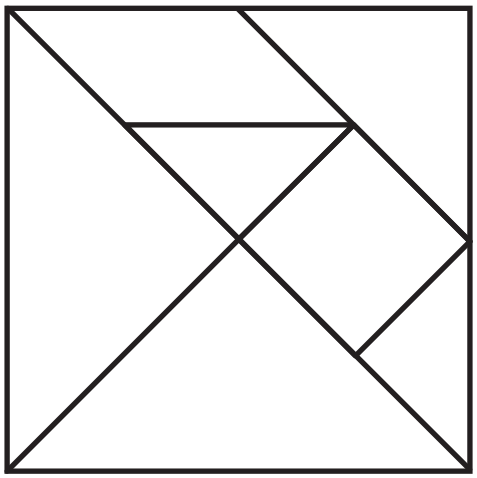




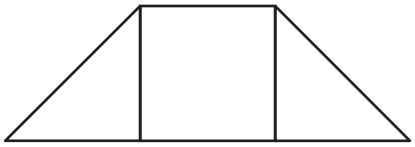
Tangram Shapes

Name _____

Cut out the tangram pieces. Use the pieces to form each shape. In the box draw the outlines of the pieces you use.

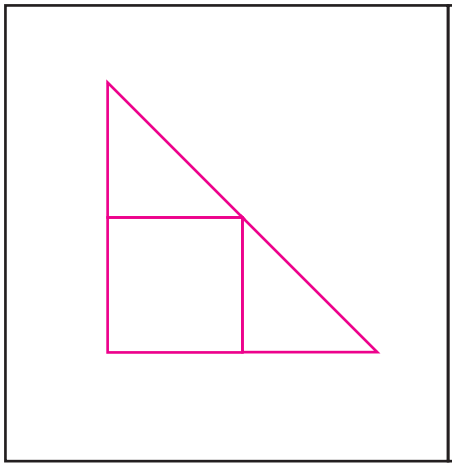


Example: trapezoid (3 pieces)

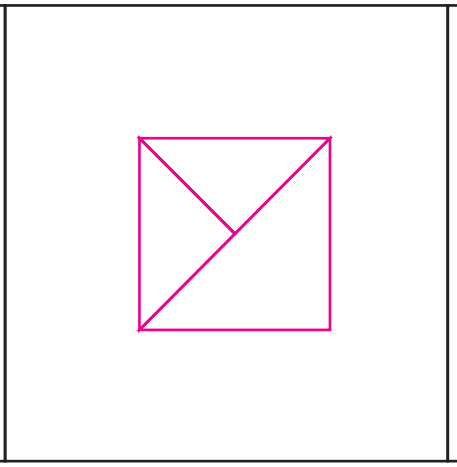


Arrangement of pieces may vary.

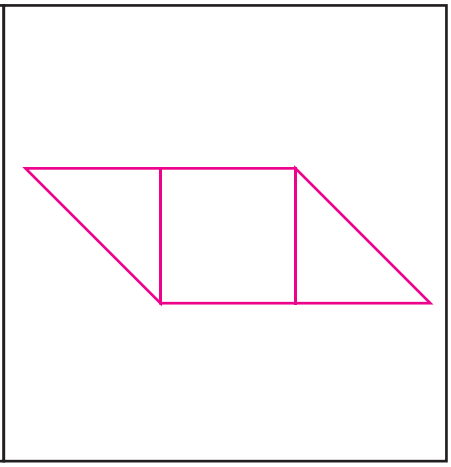
1. triangle (3 pieces)



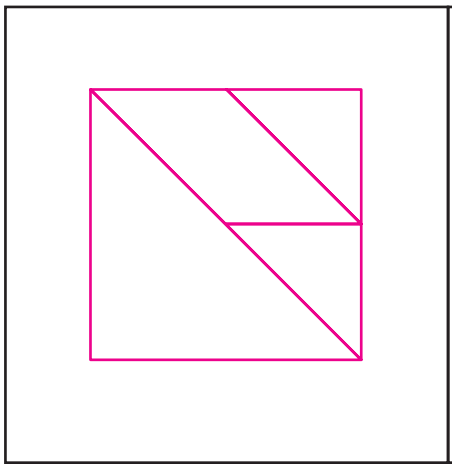
2. square (3 pieces)



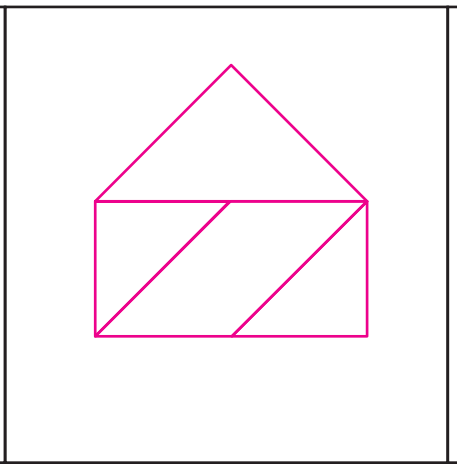
3. parallelogram (3 pieces)



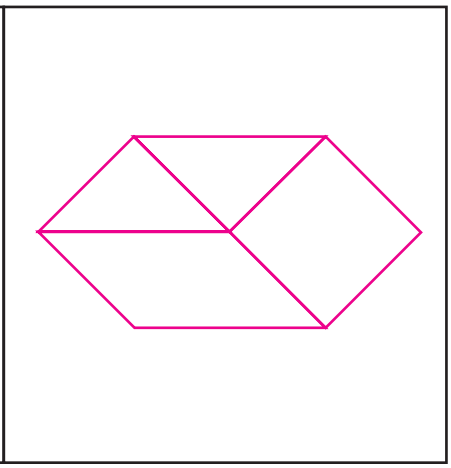
4. square (4 pieces)



5. pentagon (4 pieces)



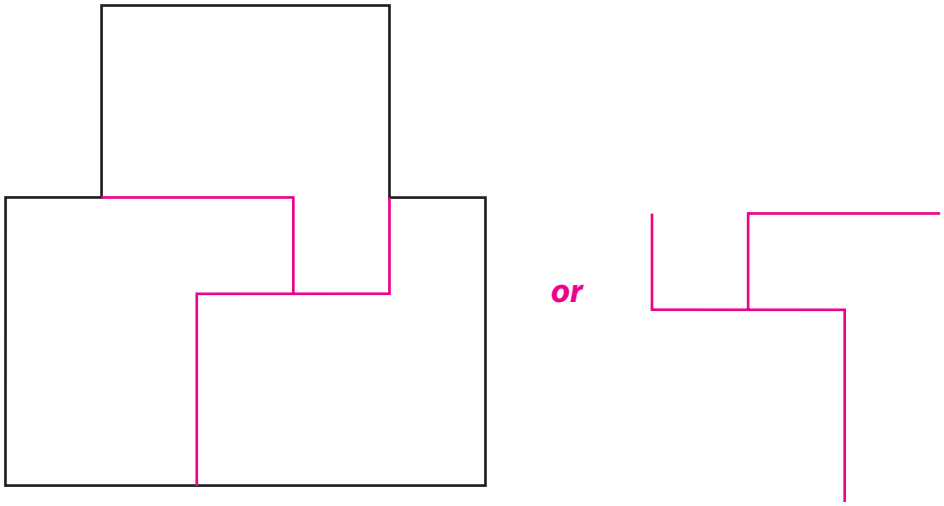
6. hexagon (4 pieces)



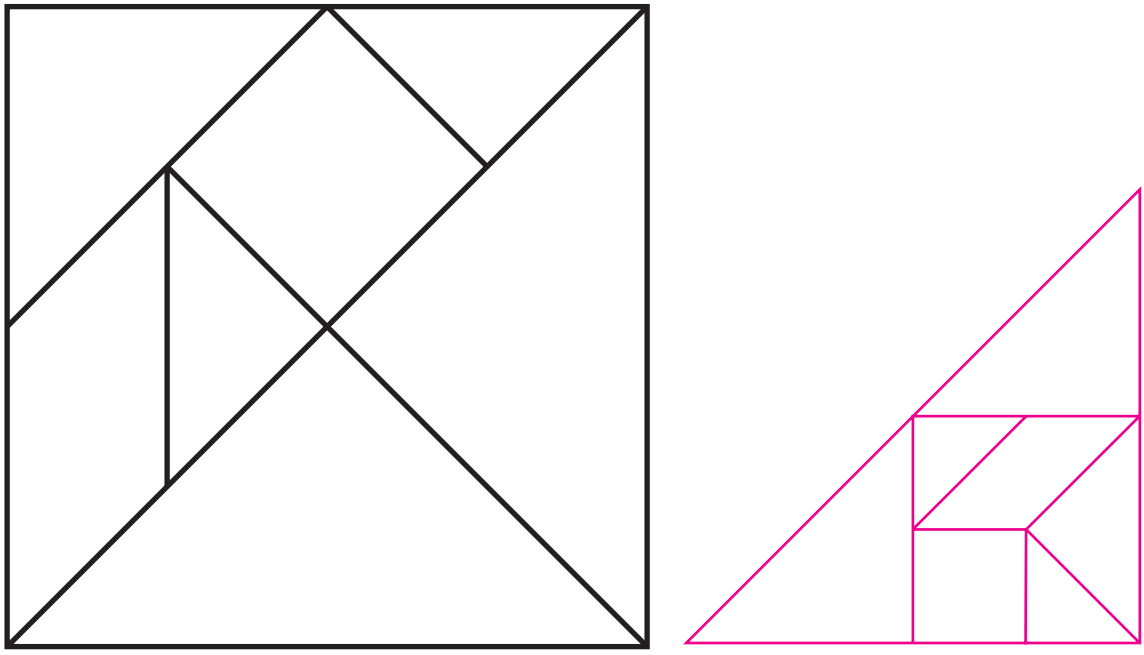
Tangrams Too!

Name _____

A farmer is dividing his land into 3 congruent pieces to give to his 3 children. Draw the boundaries of the pieces.



Cut out the tangram pieces. Use all the pieces to make a right triangle. Trace the outlines of the pieces on another sheet of paper.

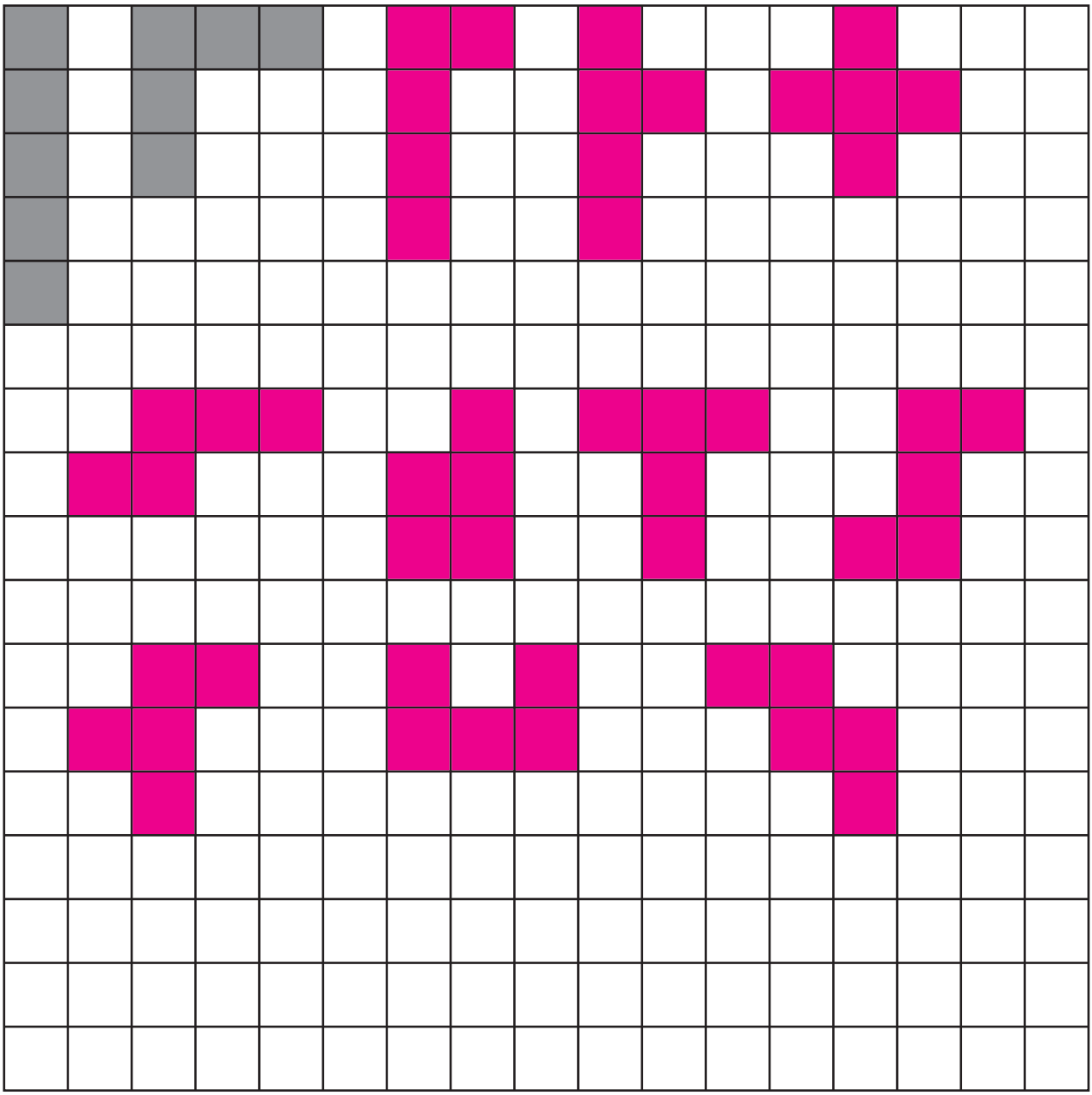


Pentominoes

Name _____

A *pentomino* is a polygon made up of 5 squares that are each connected to the others by at least one side (not corner to corner).

Can you figure out the 12 pentominoes that are possible? Make sure they are all different. A flipped or rotated object does not count as another pentomino. (Two pentominoes have been shaded for you.)



Cut out the 12 pentominoes and see if you can fit them together into a rectangle that is 6 cm by 10 cm. Some of the shapes may have to be rotated and/or flipped.

One-Sided Wonder

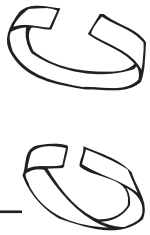
Name _____

A special branch of mathematics called topology deals with surfaces that are stretched out of shape. It is sometimes called *rubber-sheet geometry*. One of the best-known examples of topology is the Möbius strip. It was discovered by August Möbius, a German mathematician, who lived in the nineteenth century.

Making a Möbius Strip

You will need paper, scissors, and tape to make Möbius strips for the following activities.

1. Cut a strip of paper about 1 inch wide along the longer side of the paper or use a 12-inch length of adding machine tape.
2. Twist the paper one-half turn.
3. Tape the ends together.



Follow the instructions and answer the questions.

1. Make a Möbius strip. Draw a line along the middle of one side of the strip. What do you observe about the Möbius strip?

   It only has one side.

2. Cut the strip down the line that you drew. What do you get? *a longer strip*

3. Make another Möbius strip. Cut the strip into thirds along the length. What do you get?

   2 interlocking loops—1 large and 1 small

   What do you notice about the smaller strip? *It is a Möbius strip.*

4. Make another strip with two twists in it. Cut the strip in half along the length. What do you get?

   2 interlocking loops the same size

   Do the resulting pieces have one or two sides? *two* Draw a line along the middle of one side to check.

5. Make another strip. Twist the strip three times before taping. Cut the strip down the middle. What do you get?

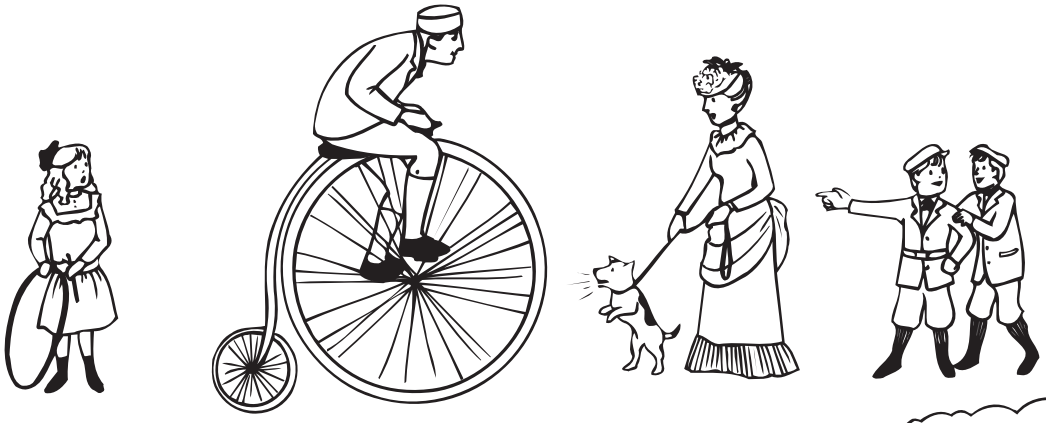
   2 loops with a knot connecting them

6. Try experimenting with several strips of your own. Perhaps try taping two strips together to make a longer strip that can be twisted more times or a wider strip that can be cut more times. Can you find a relationship between the number of twists and the resulting loops?

   Answers will vary.

Bicycles

Name _____



This type of bicycle, called the high-wheeler or penny farthing, was popular in the 1870s.

Remember that the circumference of a circle is 3.14 × the diameter or 6.28 × the radius.

Solve the following problems.

1. If the front wheel of the penny farthing has a 150-cm diameter and the back wheel has a 40-cm diameter, approximately how many times will the back wheel turn for every 1 time the front wheel turns?

   4 times

2. If the penny farthing travels 1 kilometer, approximately how many times will the front wheel turn?

   Find the total distance traveled in centimeters: *100,000 cm*

   Find the distance covered by each rotation on the tire (circumference): *471 cm*

   Divide the total distance traveled by the distance each tire rotation covers: *212* complete turns

3. If the penny farthing travels 1 kilometer, approximately how many times will the back wheel turn?

   795 or 796 times

4. If the front wheel of the penny farthing has a 180-cm diameter and the back wheel has a radius of 30 cm, approximately how many times will the back wheel turn for every time the front wheel turns?

   3 times

5. How many times will the front wheel of this penny farthing turn if it travels 2 kilometers?

   354 times

6. How many times will the back wheel of this penny farthing turn if it travels 2 kilometers?

   1,062 times

Pythagorean Theorem

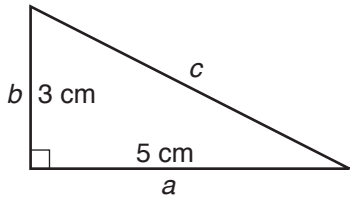
Name _____

Pythagoras was a Greek mathematician who lived during the sixth century BC. He is most commonly known for proving the Pythagorean theorem, which can be used to find the lengths of the sides of a right triangle.

> The sum of the squares of the two sides is equal to the square of the longest side.
> The equation that illustrates this theorem is $a^2 + b^2 = c^2$.

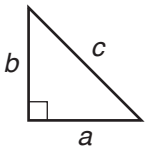
To find the length of side c using a calculator—

- Add the squares of side a and side b.
  $a^2 + b^2 =$
  $25 + 9 = 34$
- Press the square root key. Round to the nearest tenth.
  $\sqrt{34} = 5.8$ $\quad$ $c = 5.8$ cm



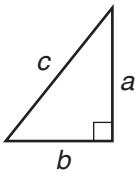
Use a calculator to find the length of side *c* in each triangle. Round to the nearest tenth.

1.



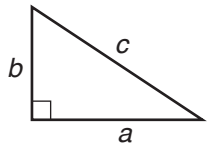
$a = 4$ cm
$b = 4$ cm
$c^2 =$ 32
$c =$ 5.7 cm

2.



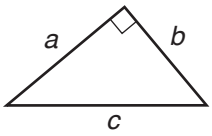
$a = 5$ cm
$b = 4$ cm
$c^2 =$ 41
$c =$ 6.4 cm

3.



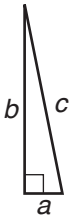
$a = 6$ cm
$b = 4$ cm
$c^2 =$ 52
$c =$ 7.2 cm

4.



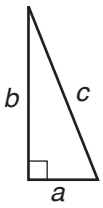
$a = 12$ cm
$b = 10$ cm
$c^2 =$ 244
$c =$ 15.6 cm

5.



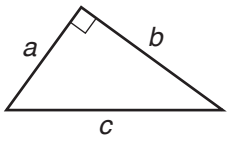
$a = 1$ cm
$b = 5$ cm
$c^2 =$ 26
$c =$ 5.1 cm

6.



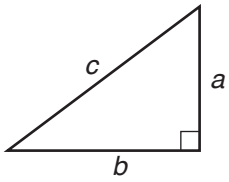
$a = 2$ cm
$b = 5$ cm
$c^2 =$ 29
$c =$ 5.4 cm

7.



$a = 8$ cm
$b = 11$ cm
$c^2 =$ 185
$c =$ 13.6 cm

8.



$a = 9$ cm
$b = 12$ cm
$c^2 =$ 225
$c =$ 15 cm

Decimal Detective

Name _____

Each answer to the following problems is incorrect. Examine each problem to discover the error. In the blanks below the problem, describe the error made. Then work the problem correctly.

1.
$$\begin{array}{r} 9.87 \\ -3.59 \\ \hline 13.46 \end{array}$$

$$\begin{array}{r} \overset{7}{\cancel{9}}.\overset{17}{\cancel{8}}\cancel{7} \\ -\,3.59 \\ \hline 6.28 \end{array}$$

Error: *added rather than subtracted*

2.
$$\begin{array}{r} 493.7 \\ 17.25 \\ +3.689 \\ \hline 10.351 \end{array}$$

$$\begin{array}{r} 493.7 \\ 17.25 \\ +\ 3.689 \\ \hline 514.594 \end{array}$$

Error: *place values/decimal points not aligned*

3.
$$\begin{array}{r} \overset{6}{\cancel{7}}\overset{10}{\cancel{0}}.\overset{10}{\cancel{0}}\overset{14}{\cancel{4}} \\ -39.56 \\ \hline 31.58 \end{array}$$

$$\begin{array}{r} \overset{6}{\cancel{7}}\overset{9}{\cancel{0}}.\overset{9}{\cancel{0}}\overset{14}{\cancel{4}} \\ -\,39.56 \\ \hline 30.48 \end{array}$$

Error: *renamed incorrectly*

4.
$$\begin{array}{r} 4{,}000 \\ +38.72 \\ \hline 78.72 \end{array}$$

$$\begin{array}{r} 4000 \\ +\ \ 38.72 \\ \hline 4{,}038.72 \end{array}$$

Error: *place values/decimal points not aligned*

5.
$$\begin{array}{r} 1.39 \\ \times 0.27 \\ \hline 973 \\ +2780 \\ \hline 37.53 \end{array}$$

$$\begin{array}{r} 1.39 \\ \times\, 0.27 \\ \hline 973 \\ +\,2780 \\ \hline 0.3753 \end{array}$$

Error: *wrong placement of decimal point in final product*

6.
$$\begin{array}{r} 2.764 \\ \times\ 3.51 \\ \hline 2764 \\ 13820 \\ +829200 \\ \hline 8.45784 \end{array}$$

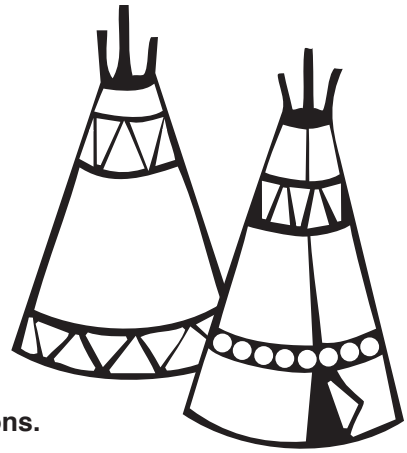
$$\begin{array}{r} 2.764 \\ \times\ \ 3.51 \\ \hline 2764 \\ 138200 \\ +\,829200 \\ \hline 9.70164 \end{array}$$

Error: *missing zero in second partial product*

Repeating Decimal Patterns

Name _____

Use a calculator to solve.



1. $5 \div 9 =$ $0.\overline{5}$
2. $73 \div 99 =$ $0.\overline{73}$
3. $462 \div 999 =$ $0.\overline{462}$
4. $28 \div 99 =$ $0.\overline{28}$
5. $758 \div 999 =$ $0.\overline{758}$

Use the patterns of the quotients in 1–5 to complete the equations.

6. $0.\overline{7} =$ 7 ÷ 9
7. $0.\overline{92} =$ 92 ÷ 99
8. $0.\overline{658} =$ 658 ÷ 999
9. $0.\overline{03} =$ 3 ÷ 99
10. $0.\overline{041} =$ 41 ÷ 999

Use a calculator to solve.

11. $1 \div 9 =$ $0.\overline{1}$
12. $2 \div 9 =$ $0.\overline{2}$
13. $3 \div 9 =$ $0.\overline{3}$
14. $4 \div 9 =$ $0.\overline{4}$
15. $5 \div 9 =$ $0.\overline{5}$
16. $6 \div 9 =$ $0.\overline{6}$
17. $7 \div 9 =$ $0.\overline{7}$
18. $8 \div 9 =$ $0.\overline{8}$
19. $1 \div 11 =$ $0.\overline{09}$
20. $2 \div 11 =$ $0.\overline{18}$
21. $3 \div 11 =$ $0.\overline{27}$
22. $4 \div 11 =$ $0.\overline{36}$
23. $5 \div 11 =$ $0.\overline{45}$
24. $6 \div 11 =$ $0.\overline{54}$
25. $7 \div 11 =$ $0.\overline{63}$
26. $8 \div 11 =$ $0.\overline{72}$

Creative Symbols

Name _____

We use symbols in mathematics to tell which operation to perform. For example, the symbol for multiplication is ×, and the symbol for addition is +.

We can create a new symbol to describe other operations to perform. For example, let's make a ⊠ that tells you to multiply the numbers together and then to add 2.

$2 \boxtimes 2 = (2 \times 2) + 2 = 6$
$4 \boxtimes 4 = (4 \times 4) + 2 = 18$

Here are some other new symbols.

△ means to divide and then add the first number to the quotient.
$36 \triangle 3 = (36 \div 3) + 36 = 48$

⊡ means to subtract and then multiply by the first number.
$24 \boxdot 10 = (24 - 10) \times 24 = 336$

Key

$a \boxtimes b$ means $(a \times b) + 2$
$a \triangle b$ means $(a \div b) + a$
$a \boxdot b$ means $(a - b) \times a$

Use the symbols in the key to solve the following problems.

1. $1.5 \boxtimes 0.5 =$ 2.75
2. $1.5 \triangle 0.5 =$ 4.5
3. $3.6 \boxdot 0.6 =$ 10.8
4. $4.5 \boxtimes 3 =$ 15.5
5. $5.3 \boxdot 0.8 =$ 23.85
6. $5.4 \triangle 0.8 =$ 12.15
7. $10.5 \triangle 3 =$ 14
8. $4.8 \boxtimes 5.6 =$ 28.88
9. $9.3 \boxdot 2.8 =$ 60.45
10. $10.8 \boxdot 5.8 =$ 54
11. $2.6 \boxtimes 3.6 =$ 11.36
12. $12.5 \boxdot 8 =$ 56.25

work space

Create some symbols of your own. Use your symbols to write three problems of your own, and let a classmate try to solve them. (Be sure to make a key for your symbols.)

Bats and Balls

Name _____

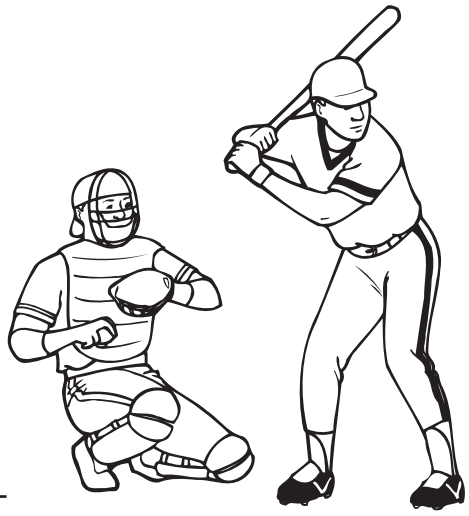
Complete the charts for the two baseball teams. Use the formula Hits ÷ At Bats = Batting Average. Round to the nearest thousandth for decimal answers.

Atwater Giants

Batter	At Bats	Hits	Average
Sheffley	597	182	.305
Thomas	557	162	.291
Green	272	75	.276
Saunders	606	166	.274
Peters	633	172	.272
Jeffers	585	158	.270

Lincoln Lions

Batter	At Bats	Hits	Average
Planck	547	174	.318
Bringham	607	181	.298
Rand	445	123	.276
Overman	591	159	.269
Smitty	516	137	.266
Karmen	619	153	.247



Find the overall average of the six players listed for each team.

1. What was the team average for the Lions? .279
2. What was the team average for the Giants? .281

Use the batting averages to answer the following questions.

3. Approximately what percent of the time did Thomas get a hit when he was at bat?

   29%

4. Approximately what percent of the time did Rand *not* get a hit when he was at bat?

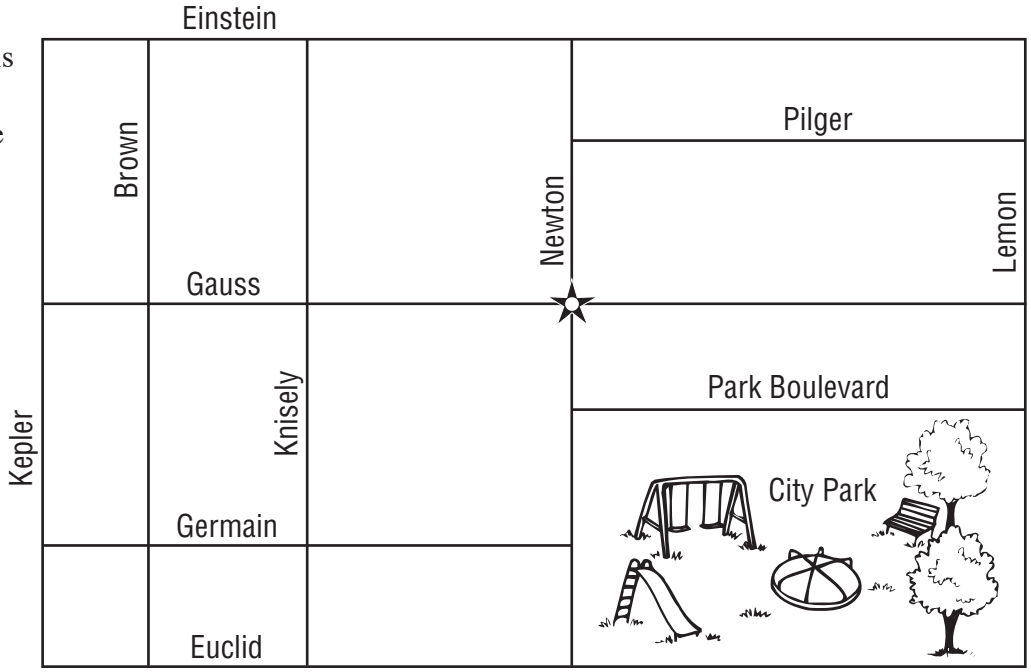
   72%

Perimeter

Name _____

Andi plans to run a 5-kilometer race. She is practicing by running different courses in the neighborhood.

1 cm = 50 m



Find the distance of each course. Start at Andi's house on the corner of Newton and Gauss. Solve the problem on a separate sheet of paper. Write and label the answer. In the circle write the number of times Andi must run each course to complete at least 5 km.

1. west on Gauss, north on Kepler, east on Einstein, south on Newton

   50 × (7 + 3.5 +7 + 3.5) = 1050 m — (5)

2. south on Newton, around City Park 3 times, north on Newton

   1.4 + [3 × (6 + 3.4 +6 + 3.4)] + 1.4 = 59.2 *50 × 59.2 = 2960 m* — (2)

3. east on Gauss, north on Lemon, west on Einstein, south on Knisely, east on Gauss

   50 × (6 + 3.5 + 9.5 + 3.5 + 3.5) = 1300 m — (4)

4. south on Newton, west on Euclid, north on Brown, east on Gauss, south on Knisely, east on Germain, north on Newton

   50 × (4.8 + 5.6 + 4.8 + 2.1 + 3.2 + 3.5 + 3.2) = 1360 m — (4)

5. west on Gauss, south on Knisely, west on Germain, north on Kepler, east on Einstein, south on Newton

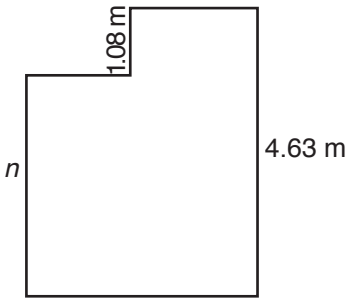
   50 × (3.5 + 3.2 + 3.5 + 6.7 + 7 + 3.5) = 1370 m — (4)

Decimal Drawings

Name _____

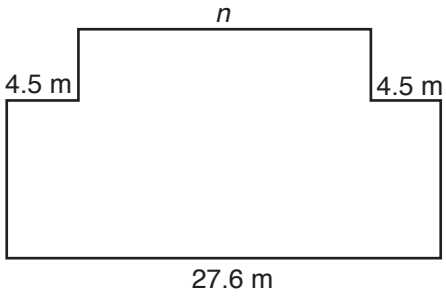
Find the length of the missing measurement (*n*) in each drawing. Write and label the answer.

1.



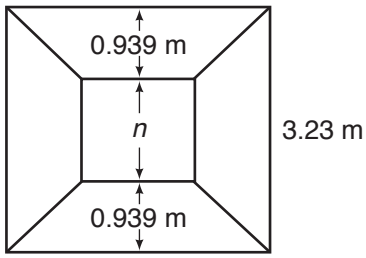
$n =$ **3.55 m**

2.



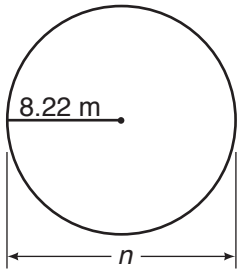
$n =$ **18.6 m**

3.



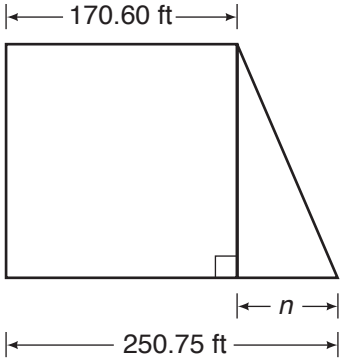
$n =$ **1.352 m**

4.



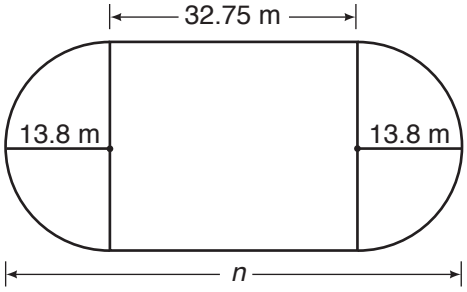
$n =$ **16.44 m**

5.



$n =$ **80.15 ft**

6.



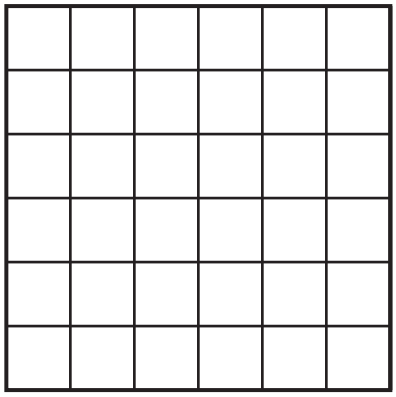
$n =$ **60.35 m**

How Many Squares?

Name _____

Find the number of squares in this figure.

1.



36 squares that are 1 × 1

25 squares that are 2 × 2

16 squares that are 3 × 3

9 squares that are 4 × 4

4 squares that are 5 × 5

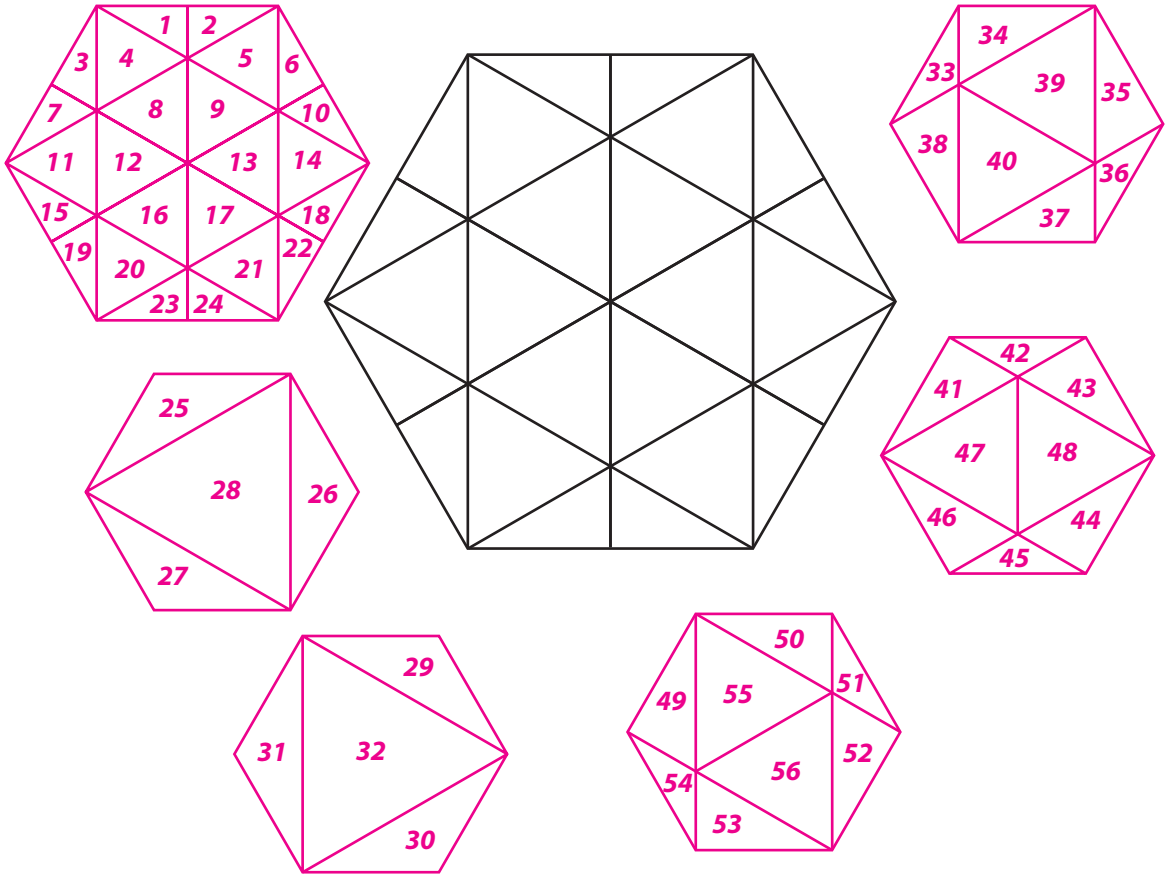
1 squares that are 6 × 6

91 total squares

2. Make a 7 × 7 square on a separate sheet of paper. Find the total number of squares. 140

Find the number of triangles in this figure.

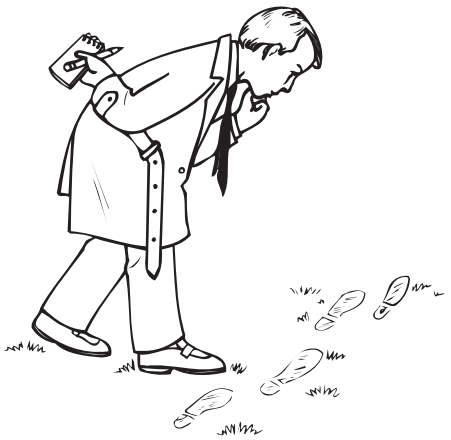
3. 56

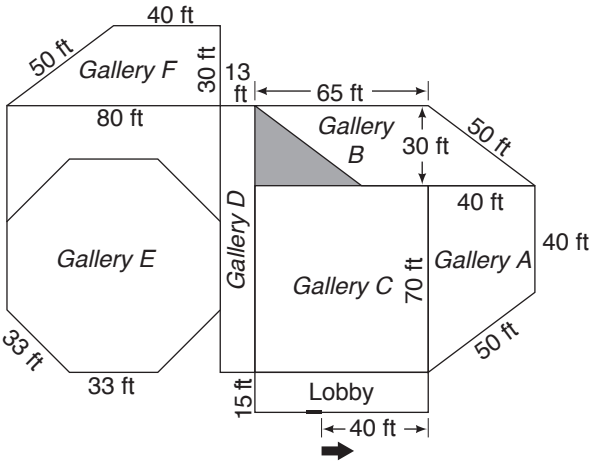


Formulating a Solution

Name _____

Inspector Gravel is investigating the theft of the Yorx Emerald from the jewel display at the Albany Museum. Use the measurements you are given to find any others you need to solve the problems. You will need to divide some of the galleries into shapes that have perimeter and area formulas you know.





1. Inspector Gravel finds large footprint traces outside the front door of the museum. He follows them for 95 feet along the perimeter of the museum (in the direction of the arrow), but then they disappear. What is the area of the room the inspector is directly outside of?

   1,600 + 600 = 2,200 ft²

2. He discovers fragments of a rope attached to the roof of the building at the point where the footprints end. The inspector goes to the roof, where he notices a skylight that has been forced open. It leads into the room that has an area of 1,800 square feet. Which room did the thief enter?

   Gallery F

3. The emerald was kept in a case in the room that has the third largest perimeter. Which room is this?

   Gallery B

4. Inspector Gravel finds large foot indentations in the carpet the entire way around Gallery B. He deduces that the thief was looking for the concealed door that is really in Gallery E. What distance did the thief walk around Gallery B, and what is the approximate area of this room?

   He walked 230 ft; area of 1,950 ft²

Make your own problem involving an area formula to describe the room in which Inspector Gravel finds the thief's fingerprints.

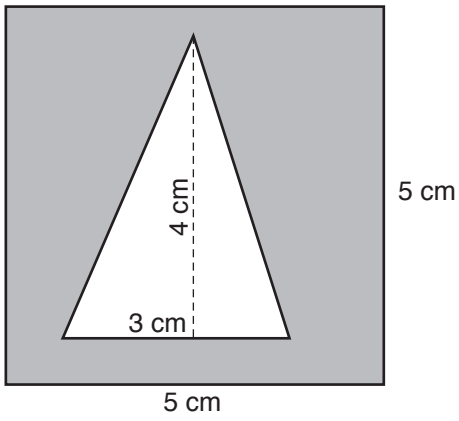
5. *Answers will vary.*

Missing Area

Name _____

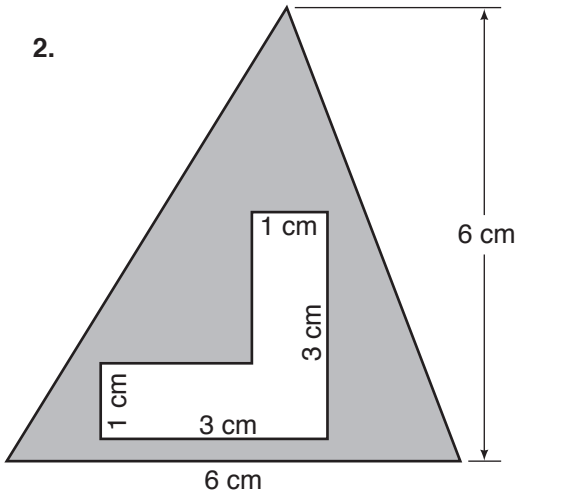
In the figures below, find the area (in square centimeters) of only the shaded portion. (Hint: Separate unshaded regions into rectangles and triangles to find the area.) Solve the problems on a separate piece of paper.

1.



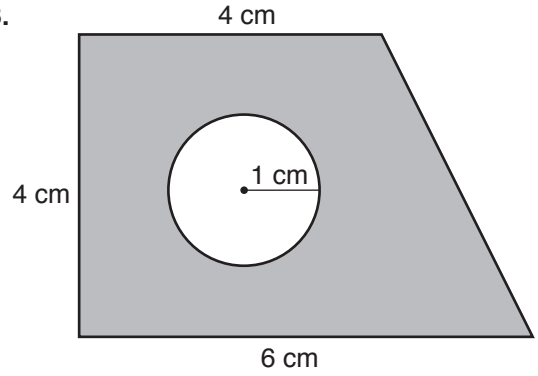
Area = ***19 cm²***

2.



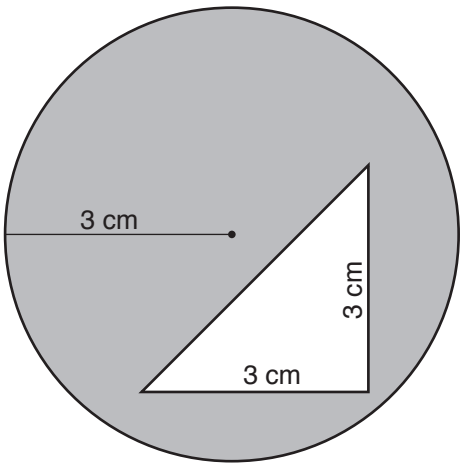
Area = ***13 cm²***

3.



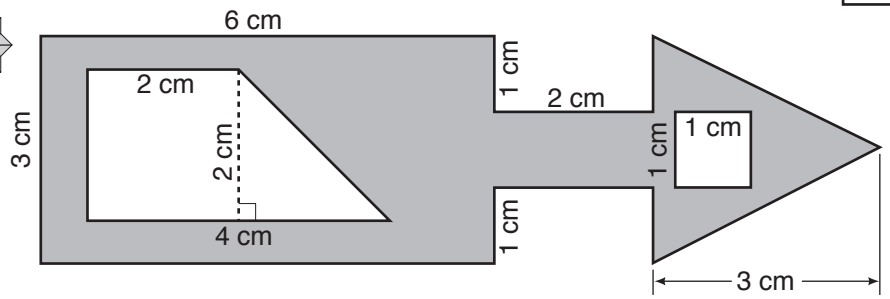
Area = ***16.86 cm²***

4.



Area = ***23.76 cm²***

5.



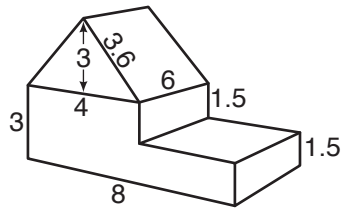
Area = ***17.5 cm²***

Super Surface

Name _____

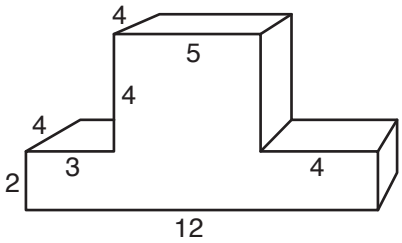
Use what you know of surface area to find the surface area of the following figures. Solve the problems on a separate sheet of paper.

1.



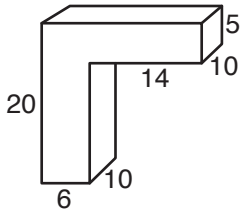
Surface area = ***199.2 units²***

2.



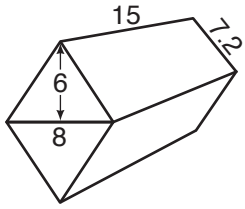
Surface area = ***232 units²***

3.



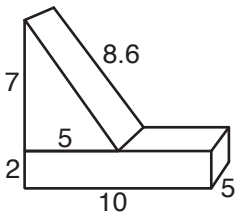
Surface area = ***1,180 units²***

4.



Surface area = ***528 units²***

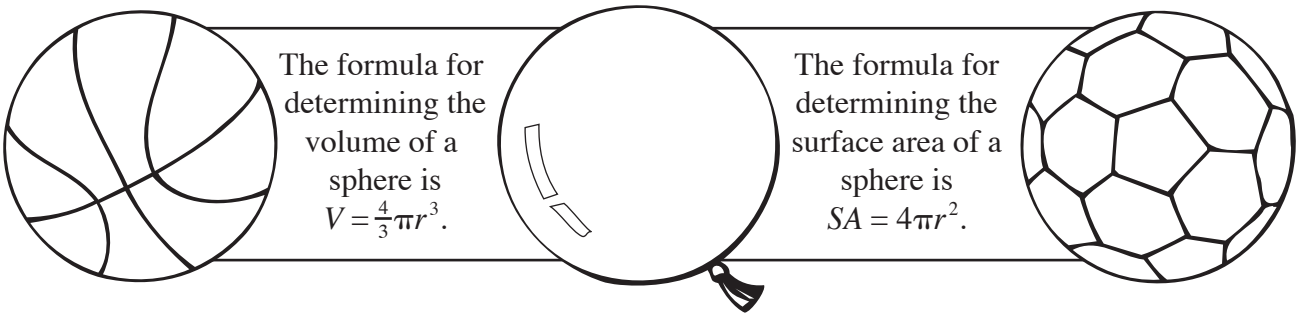
5.



Surface area = ***248 units²***

Balls and Balloons

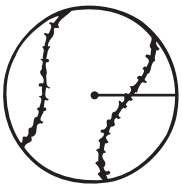
Name _____



The formula for determining the volume of a sphere is $V = \frac{4}{3}\pi r^3$.

The formula for determining the surface area of a sphere is $SA = 4\pi r^2$.

Use the formulas above to solve the problems. Round to the nearest hundredth.

1. 

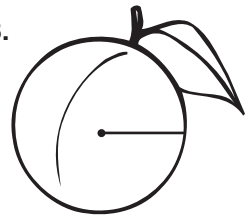
radius = 2 inches

$SA =$ **50.24 in.²**

2. 

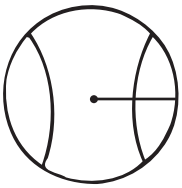
radius = 7 inches

$V =$ **1,436.03 in.³**

3. 

radius = 1.5 inches

$SA =$ **28.26 in.²**

4. 

radius = 1.25 inches

$SA =$ **19.63 in.³**

$V =$ **8.18 in.³**

Solve the word problems.

5. The Lane Bowling Alley is making a large balloon in the shape of a bowling ball for a competition. The balloon will have a diameter of 12 feet. Approximately how much canvas must they use to make the balloon? (Remember that the radius is half the diameter.)

452.16 ft²

6. An Inuit family is building an igloo in the shape of a dome (half of a sphere). If the igloo has an inside diameter of 10 feet, what is the igloo's volume?

261.67 ft³

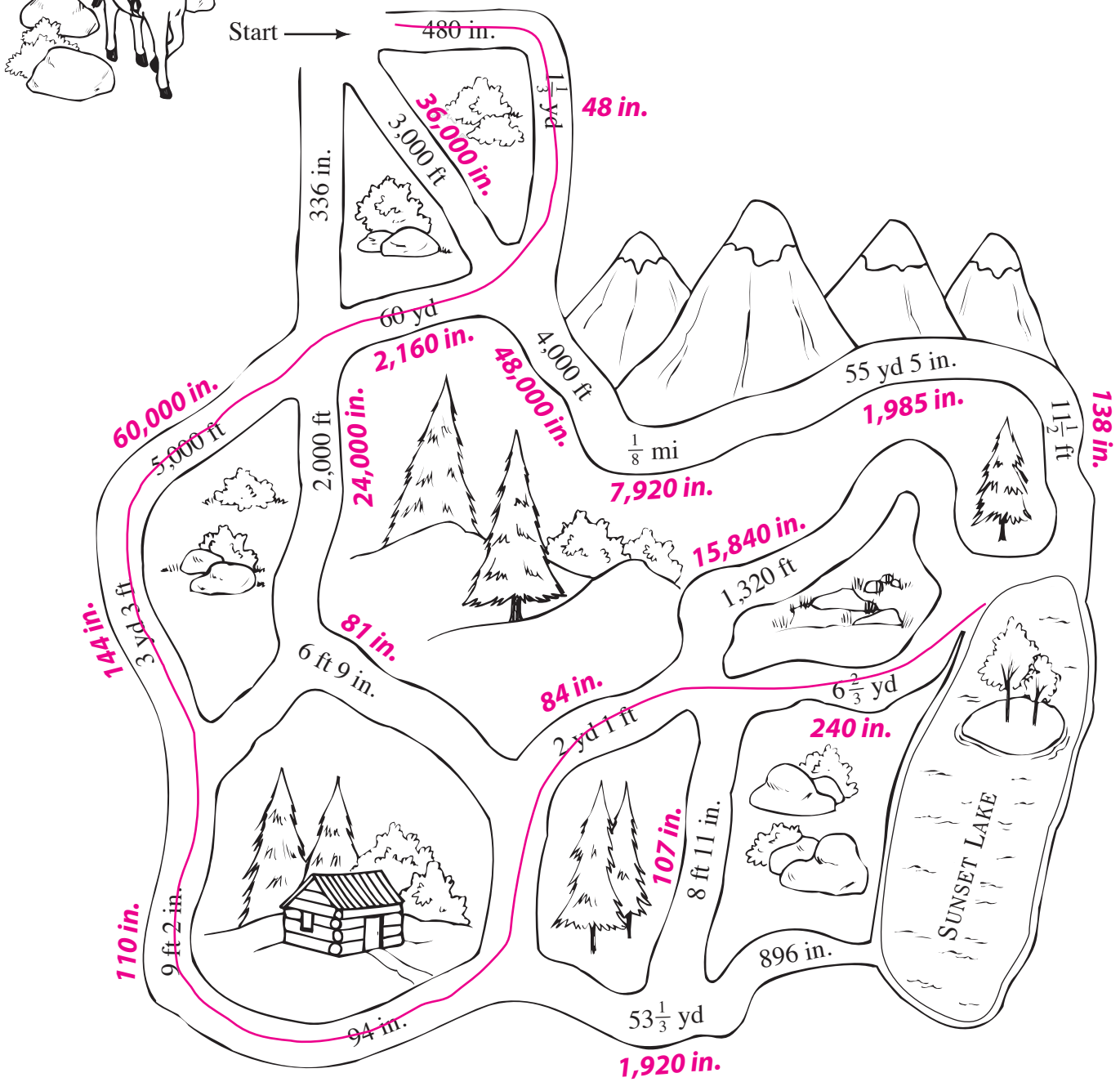
Write your own word problem using one of the sphere formulas.

7. **Answers will vary.**

Feet in a Mile

Name _____

Jack and Tommy are planning a trail ride through Horse Canyon to Sunset Lake. One trail is very rugged. The park ranger suggested an easier trail for the horses. Find the route that totals exactly one mile. Your teacher may allow you to use a calculator. Draw a line along the correct route.



Mission Miles

Name _____

Ben is on a mission team traveling from Austin, Texas, to Mexico City, Mexico.

Remember:
1 mile = 1.609 kilometers | 1 gallon = 3.785 liters | $°F = (\frac{9}{5} \times °C) + 32$

Write an equation for each word problem. Solve the problem on a separate sheet of paper. Round to the nearest hundredth. Write and label the answer.

1. When the team stopped for gasoline in Monterrey, Ben purchased 56.775 liters of gasoline for the van. How many gallons did he purchase?

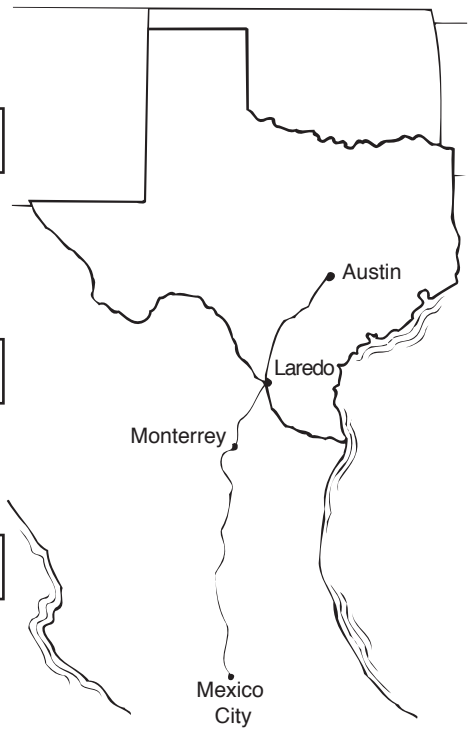
   56.775 ÷ 3.785 = 15 gal

2. When they crossed the border, a sign read 230 kilometers to Monterrey. How many miles is it from the border to Monterrey?

   230 ÷ 1.609 = 142.95 mi

3. The temperature reading at a bank in Monterrey was 18° C. What was the temperature in degrees Fahrenheit?

   $(\frac{9}{5} \times 18) + 32 = 64.4° F$



4. When the team was leaving Austin, a sign said the distance to Laredo was 228 miles. At Laredo, the sign read 1182 kilometers to Mexico City. How many miles is it from Austin to Mexico City?

   228 + (1182 ÷ 1.609) = 962.62 mi

5. In Mexico City, the team purchased 55 liters of gasoline. They charged $27.46 to the church's credit card. How much did they pay per gallon?

   $27.46 ÷ (55 ÷ 3.785) = $1.89

Double Dippers

Name _____

Mr. Scoop's Ice-Cream Shoppe

Cones
Single-dip — $0.95
Double-dip — $1.65
Triple-dip — $2.59

Each scoop = $\frac{1}{4}$ quart!

Use the information on the sign to answer the questions. Solve the problems on a separate sheet of paper. Write and label the answer.

1. How many single-dip cones can Mr. Scoop make from 1 gallon of ice cream?

   16 cones

2. Mr. Dickenson's sixth-grade class went to the ice-cream shop. There are 27 students in the class. How many gallons and quarts of ice cream does Mr. Scoop need to serve a double-dip cone to each student and Mr. Dickenson?

   3 gal, 2 qt

3. What is the total cost of the 28 cones?

   $46.20

4. Mr. Scoop pays his supplier $1.29 per gallon of ice cream. He pays $0.10 for each cone. How much profit did he make on the 28 cones?

   $38.89

5. Mr. Scoop charges $15.79 for an ice-cream cake and $3.00 for home delivery. Mr. Dickenson paid Mr. Scoop for an ice-cream cake to be delivered to his wife at home. There was 5% sales tax on the order. What was Mr. Dickenson's final cost for the cake?

   $19.73

Long Distance Conversion

Name _____

In the United States long distances are often measured in miles. In other countries long distances are measured in kilometers.

1 mile = 1.609 kilometers

Fill in the blanks.

1. When renaming miles to kilometers, ___multiply___ by 1.609.
2. When renaming kilometers to miles, ___divide___ by 1.609.

Rename the units. Solve the problems on a separate sheet of paper. Round to the nearest hundredth. Write the equations you use.

3. 4 mi = ___6.44___ km

   4 × 1.609 = 6.44 km

4. 6 mi = ___9.65___ km

   6 × 1.609 = 9.65 km

5. 10 mi = ___16.09___ km

   10 × 1.609 = 16.09 km

6. 120.5 mi = ___193.88___ km

   120.5 × 1.609 = 193.88 km

7. 6 km = ___3.73___ mi

   6 ÷ 1.609 = 3.73 mi

8. 9 km = ___5.59___ mi

   9 ÷ 1.609 = 5.59 mi

9. 16 km = ___9.94___ mi

   16 ÷ 1.609 = 9.94 mi

10. 264 km = ___164.08___ mi

    264 ÷ 1.609 = 164.08 mi

11. 18 km = ___11.19___ mi

    18 ÷ 1.609 = 11.19 mi

12. 260 mi = ___418.34___ km

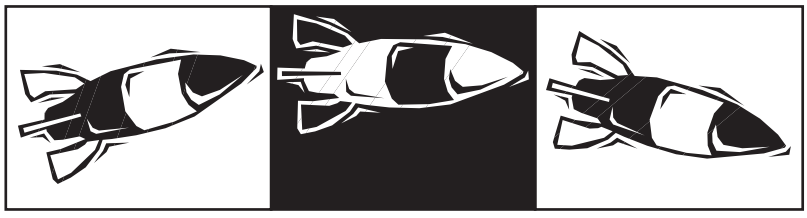
    260 × 1.609 = 418.34 km

13. 767 mi = ___1234.10___ km

    767 × 1.609 = 1234.10 km

14. 142 km = ___88.25___ mi

    142 ÷ 1.609 = 88.25 mi



Sweeter Liter

Name _____

1 gallon = 3.785 liters

Fill in the blanks.

1. When renaming liters to gallons, ***divide*** by 3.785.
2. When renaming gallons to liters, ***multiply*** by 3.785.

Write an equation for each word problem. Solve the problems on a separate sheet of paper. Round to the nearest hundredth. Write and label the answer.

3. Jason made 3 gallons of fruit punch for the class party. How many liters is this?

   3 × 3.785 = 11.36 liters

4. Cindy used a recipe to make 4.5 liters of punch. How many gallons is this?

   4.5 ÷ 3.785 = 1.19 gallons

5. Marti brought 4 two-liter bottles of ginger ale to the party to add to the punch. How many gallons of ginger ale did she bring?

   8 ÷ 3.785 = 2.11 gallons

6. Mrs. Dodd brought $4\frac{1}{4}$ gallons of sweetened iced tea to the church picnic. Mrs. Ralston brought 15 liters. Who brought more tea?

   15 ÷ 3.785 = 3.96 gallons; Mrs. Dodd

7. Mrs. White asked Mrs. Collins to bring 5 gallons of grape juice to the graduation party. Mrs. Collins brought 18 liters. Was this enough?

   18 ÷ 3.785 = 4.76 gallons; no

8. Tony brought 2 gallons, 3 quarts of punch to the party. Paul brought 7 liters. How many liters did the two boys bring in all?

   2.75 × 3.785 = 10.41 + 7 = 17.41 liters

Calculator Celsius

Name _____

Mr. Fulton compiles weather statistics for a newspaper service. Many of the temperatures from foreign countries are reported in degrees Celsius. Mr. Fulton uses a calculator to rename the degrees Celsius to degrees Fahrenheit.

Did you know . . .

The Celsius scale was devised by Anders Celsius in the eighteenth century.

Renaming Celsius to Fahrenheit $°F = (\frac{9}{5} \times °C) + 32$

Use a calculator to rename the temperatures. Round to the nearest degree. Fill in the blank to indicate the country each city is in.

World Temperatures on December 3		
City	**High**	**Low**
1. London, *England*	**2.** 2° C = *36°* F	**3.** ⁻15° C = *5°* F
4. Mexico City, *Mexico*	**5.** 17° C = *63°* F	**6.** 8° C = *46°* F
7. Toronto, *Canada*	**8.** ⁻12° C = *10°* F	**9.** ⁻30° C = *-22°* F
10. Buenos Aires, *Argentina*	**11.** 35° C = *95°* F	**12.** 26° C = *79°* F
13. Sydney, *Australia*	**14.** 32° C = *90°* F	**15.** 20° C = *68°* F

Use a calculator to rename the temperatures. Round to the nearest degree.

16. ⁻16° C = *3°* F

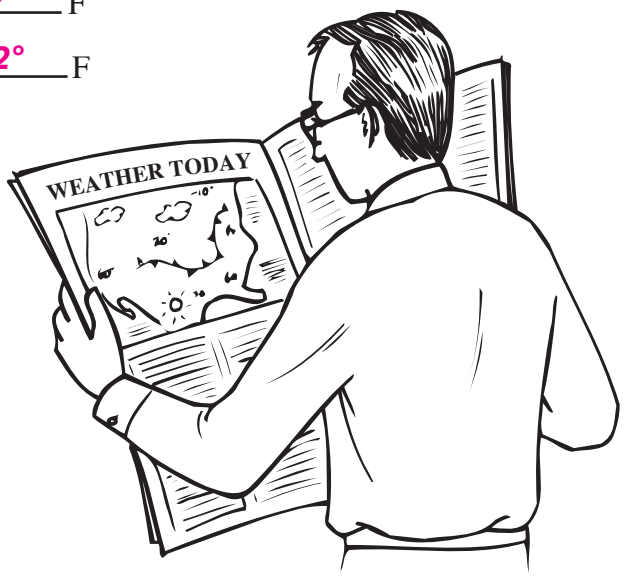
17. 5° C = *41°* F

18. 9° C = *48°* F

19. ⁻4° C = *25°* F

20. ⁻11° C = *12°* F

21. 22° C = *72°* F



All Aboard

Name _____

Read the twenty-four hour times. Write the time that has elapsed. Write your answers in hours and minutes.

1. 0031 hours to 1057 hours
   10 hr 26 min

2. 0922 hours to 2040 hours
   11 hr 18 min

3. 0154 hours to 0900 hours
   7 hr 6 min

4. 2330 hours to 0950 hours
   10 hr 20 min

Answer the following questions based on the twenty-four hour clock.

5. A sailor wanted to write his family to tell them he would reach the port at 1925 hours. He knew that his parents did not understand twenty-four hour time, though. What time should the sailor tell his family to meet him?
   7:25 PM

6. The *Titanic* struck an iceberg at 2340 hours, April 14, 1914, but it did not sink until 0220 hours the next morning. How much time did the passengers have to escape the ship?
   2 hr 40 min

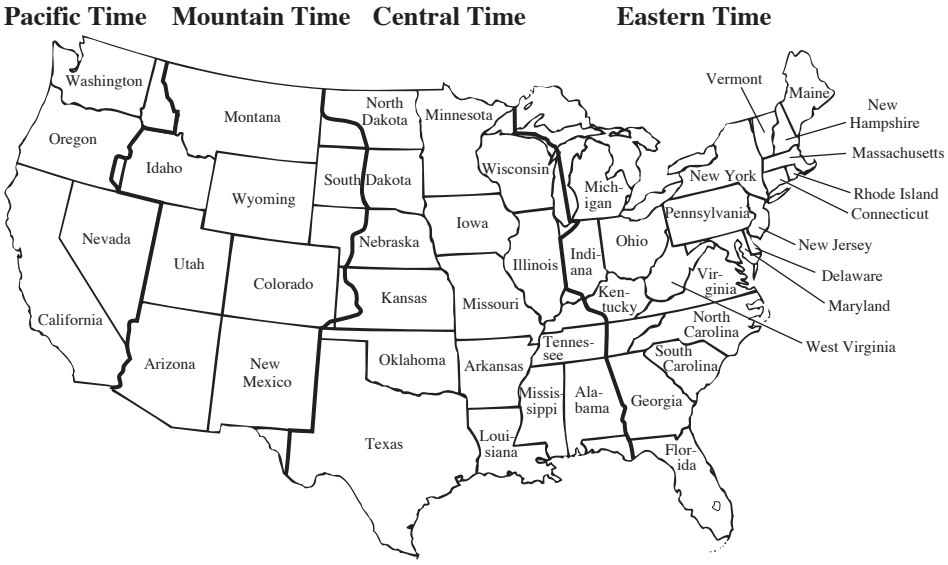
7. The *Fitzgerald* left the Sault Sainte Marie port at 0430 hours and arrived at its destination at 1310 hours the following day. How long did it take the ship to reach its destination?
   32 hr 40 min

8. The captain of the USS *Indomitable* received a message that he had exactly 3 hours and 12 minutes to reach the shore before an attack. If the message came at 0855 hours, by what time did he have to reach the shore?
   1207 hours

Time for a Trip

Name _____

Use the map of the United States to answer the following questions. The dark lines show where the time zones change.



1. Pastor Wallace is traveling throughout the United States to speak at evangelistic meetings. He leaves his home in Kansas City, Missouri, at 8:00 Monday morning and drives to Denver, Colorado. If it takes him ten hours to reach Denver, what time is it there when he arrives?

   5:00 PM

2. A meeting is scheduled for 7:30 PM on Thursday in Salt Lake City, Utah. The drive from Denver to Salt Lake City will take eight and a half hours. What time should Pastor Wallace leave Denver in order to arrive one hour before the meeting?

   10:00 AM

3. Pastor Wallace flies from Los Angeles to Pittsburgh, Pennsylvania. The flight will take four and a half hours, and he is going to leave at 1:00 PM. He is arranging for friends to meet him at the airport, so he needs to know what time it will be in Pittsburgh when he arrives.

   8:30 PM

Plan your own trip from one city to another. Use an atlas to determine the distance between the cities. Then divide the total miles by the number of miles you can travel in an hour to find the approximate number of hours for your trip. Schedule your departure time and your arrival time according to the elapsed time for your trip and the time zones you travel in.

4. *Answers will vary.*

Problem Solving: Ratio Tables

Name _____

Complete the tables. Then answer the questions.

1. Stephanie can hike 5 miles in the same time it takes her younger sister Amanda to hike 3 miles.

Stephanie	5	10	*15*	*20*	*25*	*30*	*35*
Amanda	3	6	*9*	*12*	*15*	*18*	*21*

2. How many miles can Stephanie hike in the time it takes Amanda to hike 15 miles?

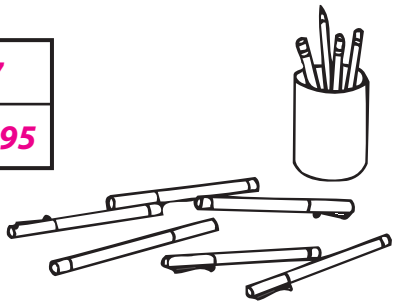
25 miles

3. If it takes Amanda $3\frac{1}{2}$ hours to hike 6 miles, how long does it take Stephanie to hike 6 miles?

2.1 hr

4. The school bookstore sells mechanical pencils for $0.85 each.

pencils	1	2	*3*	*4*	*5*	*6*	*7*
cost	$0.85	*$1.70*	*$2.55*	*$3.40*	*$4.25*	*$5.10*	*$5.95*



5. How many pencils can a student buy for $5.10?

6 pencils

6. Students receive a 10% discount if they purchase a dozen pencils. How much does a dozen pencils cost?

$9.18

7. Raul was 12 when his little brother Juan was born.

Juan	1	*2*	*3*	*4*	*5*	*6*	*7*
Raul	13	*14*	*15*	*16*	*17*	*18*	*19*

8. How old will Juan be when his brother is twice his age?

12

9. How old will Raul be when Juan is $\frac{1}{3}$ his age?

18

A Fruitful Experiment

Name _____

Professor Drake is inventing a new kind of fruit juice. He has chosen a set of ratios to help him find just the right formula:

3 cups strawberry juice to 2 cups grape juice
4 cups peach juice to 7 cups pineapple juice
4 cups grape juice to 1 cup banana juice
5 cups lemon juice to 3 cups pineapple juice
1 cup banana juice to 2 cups peach juice

Professor Drake tried his recipe in different amounts.

Write the amount of each juice he used.

1. 6 cups strawberry juice

_2_ cups peach juice

_4_ cups grape juice

_3 1/2_ cups pineapple juice

_1_ cups banana juice

_5 5/6_ cups lemon juice

What amount of juice will this formula make? _22 1/3 c_

2. _12_ cups strawberry juice

_4_ cups peach juice

_8_ cups grape juice

_7_ cups pineapple juice

2 cups banana juice

_11 2/3_ cups lemon juice

What amount of juice will this formula make? _44 2/3 c_

3. _2 4/7_ cups strawberry juice

_6/7_ cups peach juice

_1 5/7_ cups grape juice

_1 1/2_ cups pineapple juice

_3/7_ cups banana juice

$2\frac{1}{2}$ cups lemon juice

What amount of juice will this formula make? _9 4/7 c_

Triangular Numbers

Name _____

Some numbers can be shown as objects arranged in the shape of a triangle. These are called *triangular numbers*.

Complete the ratio table to find each triangular number.

1.

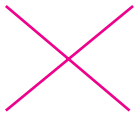
Number of rows	1	2	3	4	5	6	7	8
Number of objects	1	3	*6*	*10*	*15*	*21*	*28*	*36*

+ 2 + 3

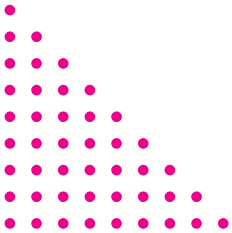
Notice how the numbers increase. Can you explain the pattern?

Jim is making a display for his coin collection. Use the ratio table to determine whether he can display each group of coins in a triangular formation. For each group that can be arranged in this way, draw dots to show the arrangement. If the group cannot be displayed in a triangular formation, make an *X* in the space.

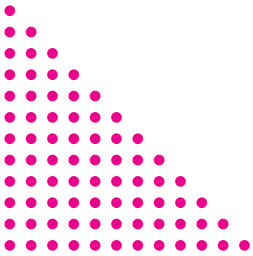
2. 30 Susan B. Anthony dollars



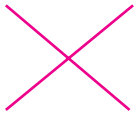
3. 45 Eisenhower dollars



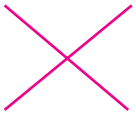
4. 78 silver dimes



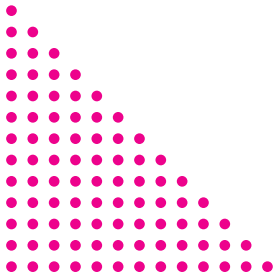
5. 50 Kennedy half-dollars



6. 67 wheat pennies



7. 91 assorted European coins

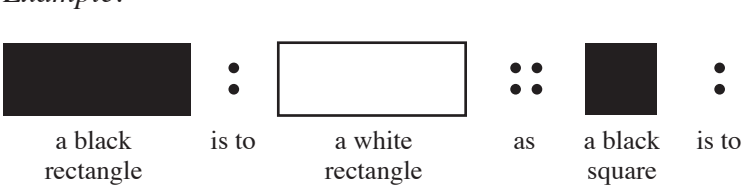


Analogies

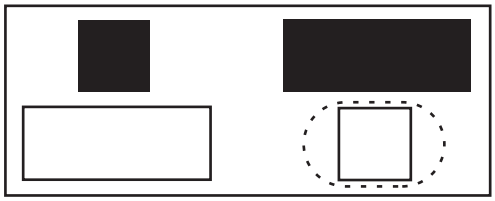
Name _____

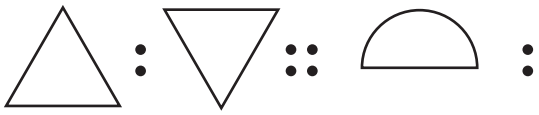
Circle the figure that completes the analogy.

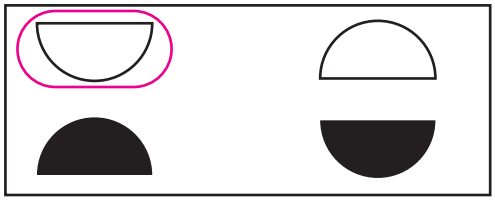
Example:



a black rectangle : is to a white rectangle :: as a black square : is to

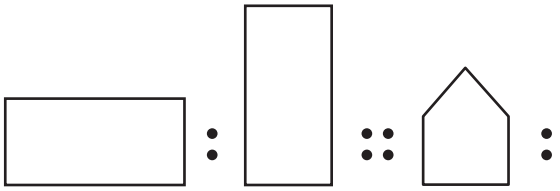


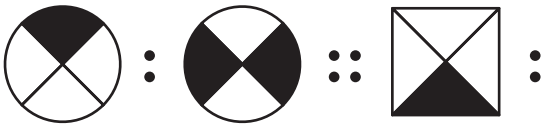
1. 



2. 

3. 

4. 

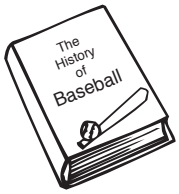
5. 

A Look at Books

Name _____

Miss Hayes the librarian bought a new bookshelf to hang on the wall. The shelf is 4 yards long. She needs to decide how many books to put on it.

Help Miss Hayes arrange the books on the new shelf by solving these problems.



1. If she put only books that are 1 inch thick on the shelf, how many will fit?

   144 books

2. If she replaces $\frac{1}{2}$ of the 1-inch books with $\frac{3}{4}$-inch books, how many more 1-inch books will she need to fill the space?

   18 books

3. If half of the shelf space is filled with $\frac{1}{2}$-inch books and the rest of the shelf space is filled with 1-inch books, how many books are on the shelf?

   216 books

4. If 70 books on the shelf are $\frac{3}{4}$ inch thick and 20 books on the shelf are $2\frac{1}{2}$ inches thick, how many $\frac{1}{4}$-inch books will fit on the rest of the shelf?

   166 books

5. If she uses $\frac{1}{3}$ of the shelf space for video tapes, how many $1\frac{1}{4}$-inch thick video tapes will fit?

   38 tapes

6. What percent of the shelf will be filled if she puts ninety $\frac{1}{3}$-inch books on the shelf? (Round to the nearest tenth of a percent.)

   20.8%

7. How many $\frac{5}{8}$-inch books will fit in $\frac{2}{3}$ of the shelf space?

   153 books

8. A large plant in the middle of the shelf takes up 1 foot of space. How many $\frac{2}{3}$-inch books will fit on one side of the plant? What percentage of space is left? (Round to the nearest tenth of a percent.)

   99 books *45.8%*

Shrinking Money

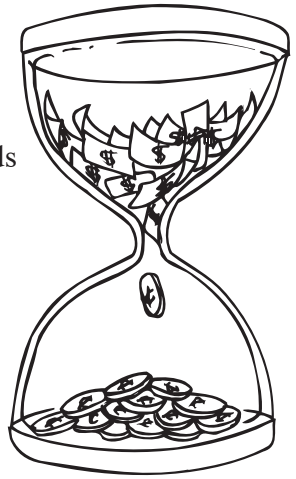
Name _____

Inflation causes an increase in the prices of goods. This in turn causes the monetary unit of a country to lose some of its value. For example, the inflation rate of the U.S. was 3% in 1992. That means that an item cost approximately 3% more at the end of the year than at the beginning, and a dollar purchased 3% less. You could determine the new price of an item by multiplying its original value by 1.03 or by adding 3% of the price to the original price.

Use the given information to answer the following questions. Round your answers to the nearest cent or whole number. Label the answer with the correct monetary unit.

1. A mild inflation rate is 2 to 4 percent. In 1992 Singapore had an inflation rate of 2.3%. The country uses the dollar as its monetary unit. If an item had cost $4.00 at the end of 1991, how much did it cost at the end of 1992?

   $4.09



2. A moderate inflation rate is 5 to 9 percent. Cyprus had an inflation rate of 6.9% in 1992. Its monetary unit is the pound. If an item had cost 15 pounds at the beginning of 1992, how much did it cost at the end of the year?

   16 pounds

3. A severe inflation rate is 10% or higher. Ecuador had an inflation rate of 54.6% in 1992. If an item had cost 20 sucres (the basic monetary unit) at the beginning of the year, how much did it cost at the end of the year?

   31 sucres

4. Brazil's financial status was in such shambles in 1992 that its inflation rate was 1,100%. At the time, its monetary unit was the cruziero. If an item had cost 4 cruzieros at the beginning of 1992, how much did it cost at the beginning of 1993?

   44 cruzieros

5. Brazil's inflation rate in 1991 was 440%. If you had purchased an item for 10 cruzieros at the beginning of 1991 instead of waiting until the end of 1992, how many cruzieros would you have saved? (Hint: Determine the price increase for 1991 and then use the new price to determine the price at the end of 1992.)

   66 cruzieros

6. Occasionally, a country's goods will actually decrease in price. In 1992 Bahrain had an inflation rate of $^{-}$0.2%. If an item had cost 500 dinars (the monetary unit) at the beginning of the year, how much did it cost at the end of the year? (Hint: Subtract 0.2% from 100% and then multiply.)

   499 dinars

7. Do you think it is difficult for missionaries to live in a country that has a high inflation rate? Explain your answer.

   Answers will vary.

Multiply Your Money

Name _____

Interest is called *compounding interest* when it is earned for the total amount of money you have in an account (including interest already earned) instead of being earned for only the initial amount you invested. You can determine how much money you will have at the end of a length of time by using the following formula.

$$Amount = principal \times (1 + rate)^n$$

The *principal* is the amount you invested initially, the *rate* is the interest rate expressed as a decimal, and n is the number of time periods (years) over which the interest is compounded.

Example:

Jennifer put $500 into a savings account at 4% interest rate. How much money will Jennifer have in her account after 4 years?

Think: *Principal* = $500, *Rate* = 0.04, $n = 4$

Jennifer will have $500 \times (1 + 0.04)^4$ or $584.93

Use the formula to solve the following word problems.

1. The Gregorys bought a 10-year US Treasury bond for $10,000. If the bond earns 8% interest that compounds once a year, how much will the bond be worth at the end of 10 years?

   $21,589.25

2. Tony's grandmother sent him $1,000 to save for college. He put the money in a savings account that pays 2.3% interest. How much money will be in Tony's account after 6 years?

   $1,146.18

3. Jonathan bought a $750 certificate of deposit. His money earns 5.4% interest for a year and then 5% the next year. How much will Jonathan's certificate of deposit be worth after 2 years?

   $830.03

4. The Thompsons have $2,000 to invest for 5 years. Will they earn more money by putting their money in a savings acount that earns 3% interest for 2 years and then 5% for 3 years or by purchasing a bond that earns 4% every year?

   savings account

5. The Millers put $750 in a savings account for their son Nathaniel when he was born. The money earned 5.9% interest and compounded once per year. Nathaniel is eighteen and wants to use the money for college. How much is in the account?

   $2,104.69

Grocery Shopping

Name _____

When shopping for groceries, you may purchase many different sizes of the same item. To compare the costs of the various sizes, you may need to compare the unit price for each item. A unit price is the cost of one unit of an item, such as one ounce of popcorn. These prices are figured as $\frac{1}{10}$ of a cent (a mill) or 0.001 of a dollar.

Example: Find the price per ounce (unit price) of a 1 lb 8 oz package of popcorn that costs $1.89. (Use your calculator.)

Step 1: Rename 1 lb 8 oz as ounces.
1 lb 8 oz = 16 oz + 8 oz = 24 oz
Step 2: Divide the cost of the item by the ounces to find the price per ounce.
$1.89 ÷ 24 = 0.07875
Step 3: Round to the nearest tenth of a cent.
$0.079
The unit price is $0.079 per ounce.

Solve the following problems.

1. Renee is shopping at Foods Galore for a jar of peanut butter. She has 3 brands to choose from. Which brand has the lowest unit price?

Plantation Brand	**Festival Brand**	**Old West Brand**
regular price	sale price	regular price
10 oz for $1.19	1 lb 4 oz for $1.89	1 lb 12 oz for $2.79

Festival Brand—$0.095 per ounce

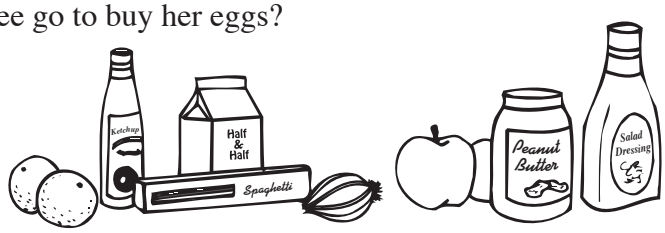
2. Renee has some coupons for cereal, and she knows that coupons reduce unit prices. Which of the cereals has the lowest unit price? (Hint: Subtract the coupon savings before dividing to find the unit price.)

Marshmallow Munchies	**Blueberry Crunch**	**Strawberry Delights**
12 oz for $2.22	1 lb 12 oz for $2.85	2 lb 10 oz for $3.99
coupon for $0.50	no coupon	coupon for $0.75

Strawberry Delights—$0.077 per ounce

3. The costs of traveling can affect a total grocery bill. After she gets home, Renee realizes that she forgot to buy a dozen eggs. Foods Galore has a dozen eggs for $1.05, but Old Dixie has them on sale for $0.89. The distance to Foods Galore is 1 mile each way. Old Dixie is a 4-mile round trip. Renee's car consumes about $0.10 of gasoline per mile. Where should Renee go to buy her eggs?

Foods Galore



Making a Graph

Name _____

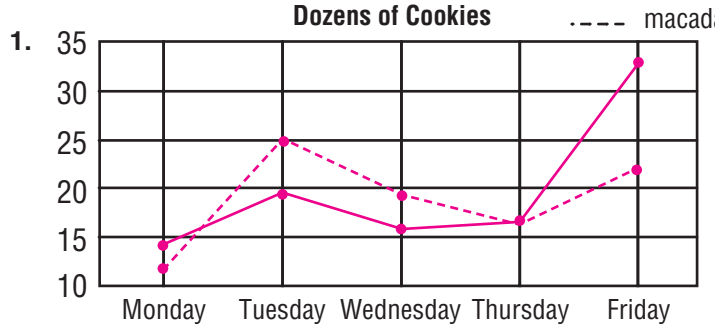
Grandma Stuart sells her homemade cookies to individuals and restaurants. She keeps records of the number of phone calls she receives, the number of orders made, and the number and types of cookies ordered.

Phone Calls June 26–30	
Monday 6/26	𝍸 𝍸 𝍸 I
Tuesday 6/27	𝍸 𝍸 𝍸 IIII
Wednesday 6/28	𝍸 𝍸 𝍸 II
Thursday 6/29	𝍸 𝍸 𝍸 𝍸 III
Friday 6/30	𝍸 𝍸 𝍸 𝍸 𝍸 IIII

Cookie Orders (Dozens) June 26–30		
	Chocolate chip	Macadamia nut
Monday 6/26	𝍸 𝍸 IIII	𝍸 𝍸 II
Tuesday 6/27	𝍸 𝍸 𝍸 IIII	𝍸 𝍸 𝍸 𝍸 𝍸
Wednesday 6/28	𝍸 𝍸 𝍸 I	𝍸 𝍸 𝍸 IIII
Thursday 6/29	𝍸 𝍸 𝍸 II	𝍸 𝍸 𝍸 II
Friday 6/30	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 III	𝍸 𝍸 𝍸 𝍸 II

Use the record sheets to make a double line graph showing the orders for chocolate chip and macadamia nut cookies.

1.



Use the record sheets and line graph to answer the questions. Solve the problems on a separate sheet of paper.

2. On what day were the most phone calls received? ***Friday (6/30)***

3. On what day were the most orders placed? ***Friday (6/30)***

4. What is the total number of cookies ordered during the week? ***2,328 cookies***

5. What is the difference between the total number of chocolate chip cookies and the total number of macadamia nut cookies? ***48 cookies or 4 dozen***

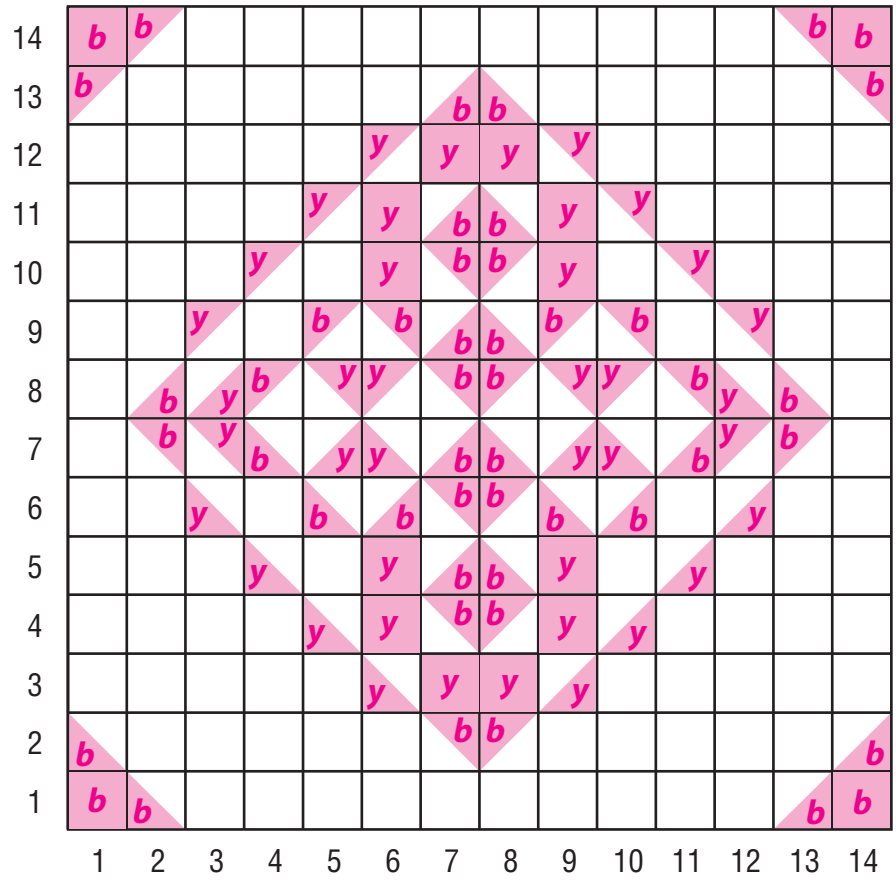
6. One dozen chocolate chip cookies costs $3.25. One dozen macadamia nut cookies costs $4.45. How much money was paid to Grandma Stuart during the week if there is a 5% sales tax? ***$781.73***

7. Grandma Stuart's costs are $1.35 for each dozen chocolate chip cookies and $2.02 for each dozen macadamia nut cookies. What was her profit for the week? ***$418.95***

Graph Plot

Name _____

This box is similar to a coordinate graph. You will be locating boxes instead of points. Find the box indicated by the ordered pair. Color the box the same as the box to the left of the list of ordered pairs.



Blue

- (1, 14), (1, 1), (14, 14), (14, 1)
- (1, 13), (2, 14), (13, 7), (8, 2), (4, 8), (5, 9), (8, 10), (8, 8), (8, 6), (9, 9), (8, 4)
- (13, 14), (14, 13), (2, 7), (7, 2), (7, 4), (7, 6), (7, 8), (7, 10), (6, 9), (10, 9), (11, 8)
- (1, 2), (2, 1), (13, 8), (8, 5), (5, 6), (9, 6), (4, 7), (8, 9), (8, 11), (8, 7), (8, 13)
- (13, 1), (14, 2), (7, 13), (7, 5), (6, 6), (10, 6), (7, 7), (11, 7), (2, 8), (7, 9), (7, 11)

Yellow

- (7, 3), (8, 3), (7, 12), (8, 12), (6, 4), (6, 5), (9, 4), (9, 5), (6, 10), (6, 11), (9, 10), (9, 11)
- (3, 9), (4, 10), (5, 11), (6, 12), (6, 8), (10, 8), (12, 7)
- (9, 12), (10, 11), (11, 10), (12, 9), (5, 8), (9, 8), (3, 7)
- (3, 6), (4, 5), (5, 4), (6, 3), (6, 7), (10, 7), (12, 8)
- (9, 3), (10, 4), (11, 5), (12, 6), (5, 7), (9, 7), (3, 8)

Circle Expense

Name _____

Mr. Davis has a monthly income of $2,570.00. He made a list of his monthly expenses.

Monthly Expenses

Tithe	$257.00	Savings	$283.00
House payment	$488.00	Insurance	$122.00
Car maintenance	$ 85.00	Child's schooling	$200.00
Utilities	$100.00	Food	$310.00
Miscellaneous	$340.00	Taxes	$385.00

Use the expense information to make a circle graph. (Hint: You will need to find what percentage of the total income each category is.) Round to the nearest percent and to the nearest degree. Fill in the blanks.

	Percent of Income	Degrees in Angle
1. Tithe	10%	36°
2. Savings	11%	40°
3. House	19%	68°
4. Insurance	5%	18°
5. Car	3%	11°
6. School	8%	29°
7. Utilities	4%	14°
8. Food	12%	43°
9. Miscellaneous	13%	47°
10. Taxes	15%	54°

Turtle Time

Name _____

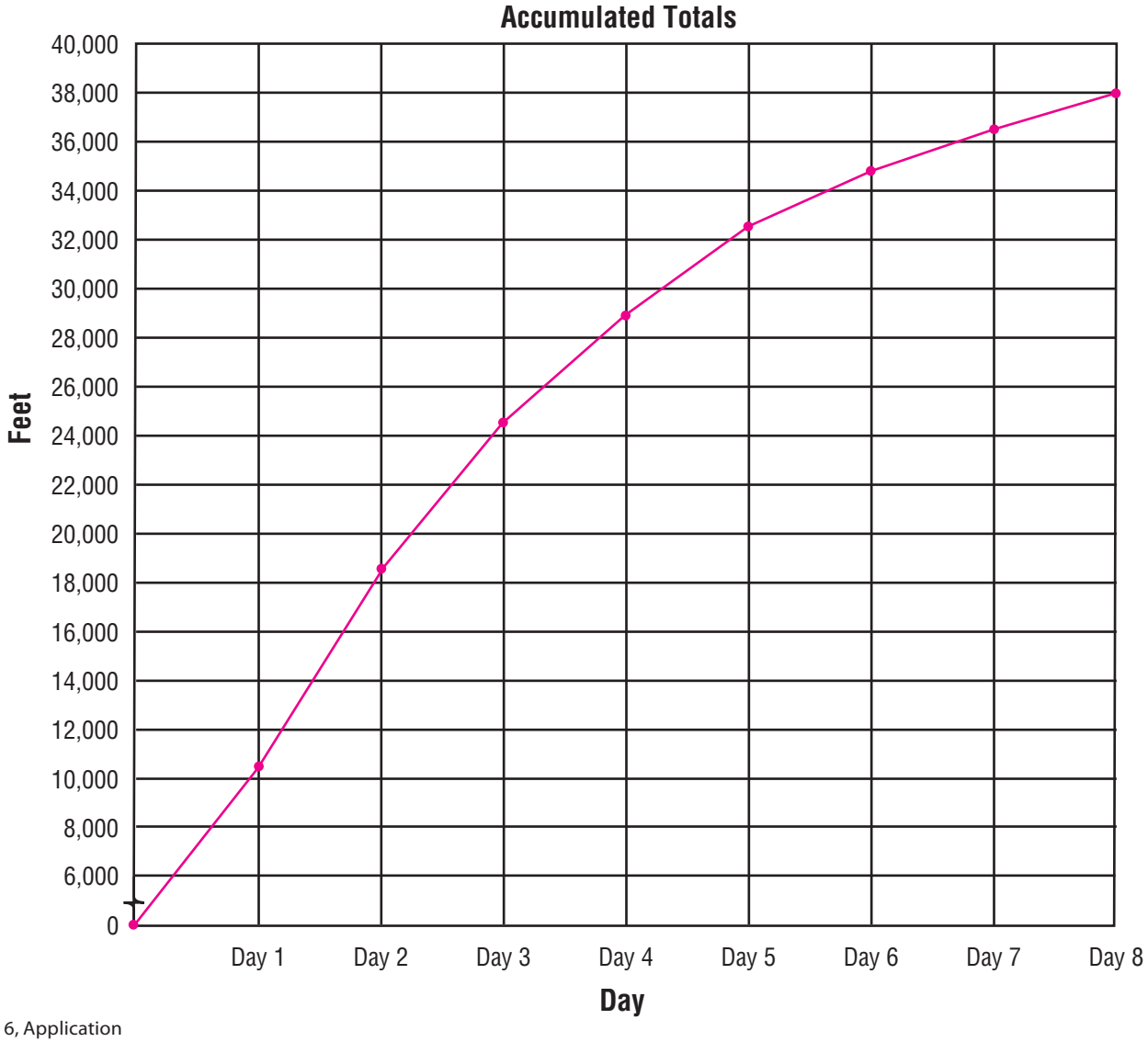
Timothy Turtle traveled to Toledo. The first day he traveled 2 miles (10,560 feet). The second day he traveled 75% of that distance. Each day thereafter he traveled 75% of the previous day's distance.

Write the number of feet traveled each day. Round to the nearest foot.

1. Day 1 ___10,560___ feet
2. Day 2 ___7,920___ feet
3. Day 3 ___5,940___ feet
4. Day 4 ___4,455___ feet
5. Day 5 ___3,341___ feet
6. Day 6 ___2,506___ feet
7. Day 7 ___1,880___ feet
8. Day 8 ___1,410___ feet
9. Timothy arrived in Toledo at the end of day 8. How far had he traveled in all? ___38,012___ feet or ___7.2___ miles

Make a line graph showing Timothy's accumulated progress. Each day's line should show the total number of feet Timothy has traveled to that point. (Your teacher may allow you to use a calculator.)

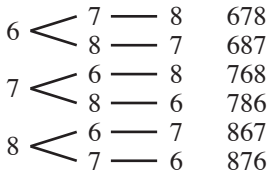
10.



How Many Ways?

Name _____

How many different numbers can be formed from the three numerals 6, 7, and 8 if no numeral is used more than once?



The number of possible outcomes can be found by using the Fundamental Principle of Counting. There are three choices for the Hundreds place, two choices for the Tens place, and one choice for the Ones place. Multiply these values together to find the number of possible outcomes.

3 × 2 × 1 = 6 possible outcomes (numbers)

How many different 4-digit numbers can be formed from the six numerals 1, 2, 3, 4, 5, and 6 if no numeral is used more than once?

6 × 5 × 4 × 3 = 360 possible outcomes (numbers)

How many different 4-digit numbers can be formed if the six numerals can be used more than once?

6 × 6 × 6 × 6 = 1,296 possible outcomes (numbers)

Use the Fundamental Principle of Counting to write an equation for each problem. Solve the problems and label the answers.

1. Jason has 5 different model cars on a shelf. How many different ways can these models be arranged?

   5 × 4 × 3 × 2 × 1 = 120 arrangements

2. Mr. Adams, his wife, and their 3 children are going to church. How many different ways can the family sit in the 5-passenger car if Mr. Adams drives?

   1 × 4 × 3 × 2 × 1 = 24 ways

3. How many 7-digit phone numbers can be formed if the digits can be used only one time?

   10 × 9 × 8 × 7 × 6 × 5 × 4 = 604,800 phone numbers

4. How many 7-digit phone numbers can be formed if the first digit cannot be 0 or 1 and the digits can be used only one time?

   9 × 8 × 7 × 6 × 5 × 4 × 3 = 181,440 phone numbers

5. There are 20 students in the sixth-grade class. If 6 students are placed in the first row, how many different arrangements can be made of the first row?

   20 × 19 × 18 × 17 × 16 × 15 = 27,907,200 arrangements

Football Fever

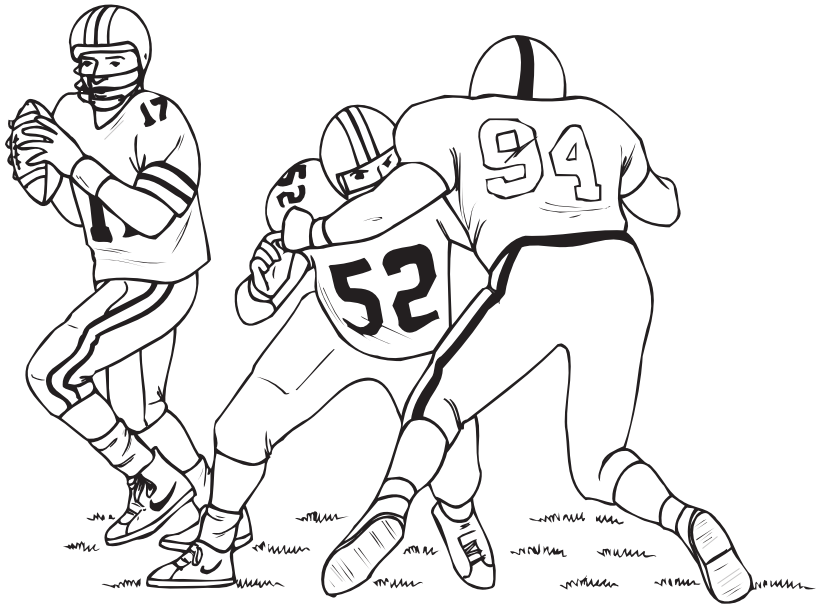
Name _____

The Centerville Tigers beat the Greenridge Vikings in the championship game. The final score was Centerville 27, Greenridge 24. Using the following information, find as many different ways as you can that the teams could have arrived at the final score.

6 points for a touchdown (TD)
1 point for kicking a point after a touchdown (PAT)
2 points for running or passing into the end zone after a touchdown (CP)
3 points for a field goal (FG) (A field goal can be attempted at any time.)

Write 8 possible ways each team could have achieved its score.

Centerville Tigers: 27	Greenridge Vikings: 24
1. *4 TD, 3 PAT*	9. *4 TD*
2. *4 TD, 1 FG*	10. *3 TD, 2 FG*
3. *3 TD, 1 PAT, 1 CP, 2 FG*	11. *3 TD, 1 PAT, 1 CP, 1 FG*
4. *3 TD, 3 FG*	12. *3 TD, 3 PAT, 1 FG*
5. *2 TD, 1 PAT, 1 CP, 4 FG*	13. *2 TD, 4 FG*
6. *2 TD, 5 FG*	14. *2 TD, 1 PAT, 1 CP, 3 FG*
7. *1 TD, 7 FG*	15. *1 TD, 6 FG*
8. *9 FG*	16. *8 FG*



Island Treasure

Name _____

A sailor was stranded on a desert island. One day he found a map showing a buried treasure. The first day the sailor dug 30 inches. Each day after that the sailor dug half the distance of the depth of the hole. During the night, however, the sand filled in $\frac{1}{4}$ of the hole. The treasure was buried 60 inches under the sand.

Use the table to help you find the number of days it took the sailor to find the treasure. Fill in the remaining boxes. Round the decimals to the nearest whole number. You may use a calculator. Then answer the question below.

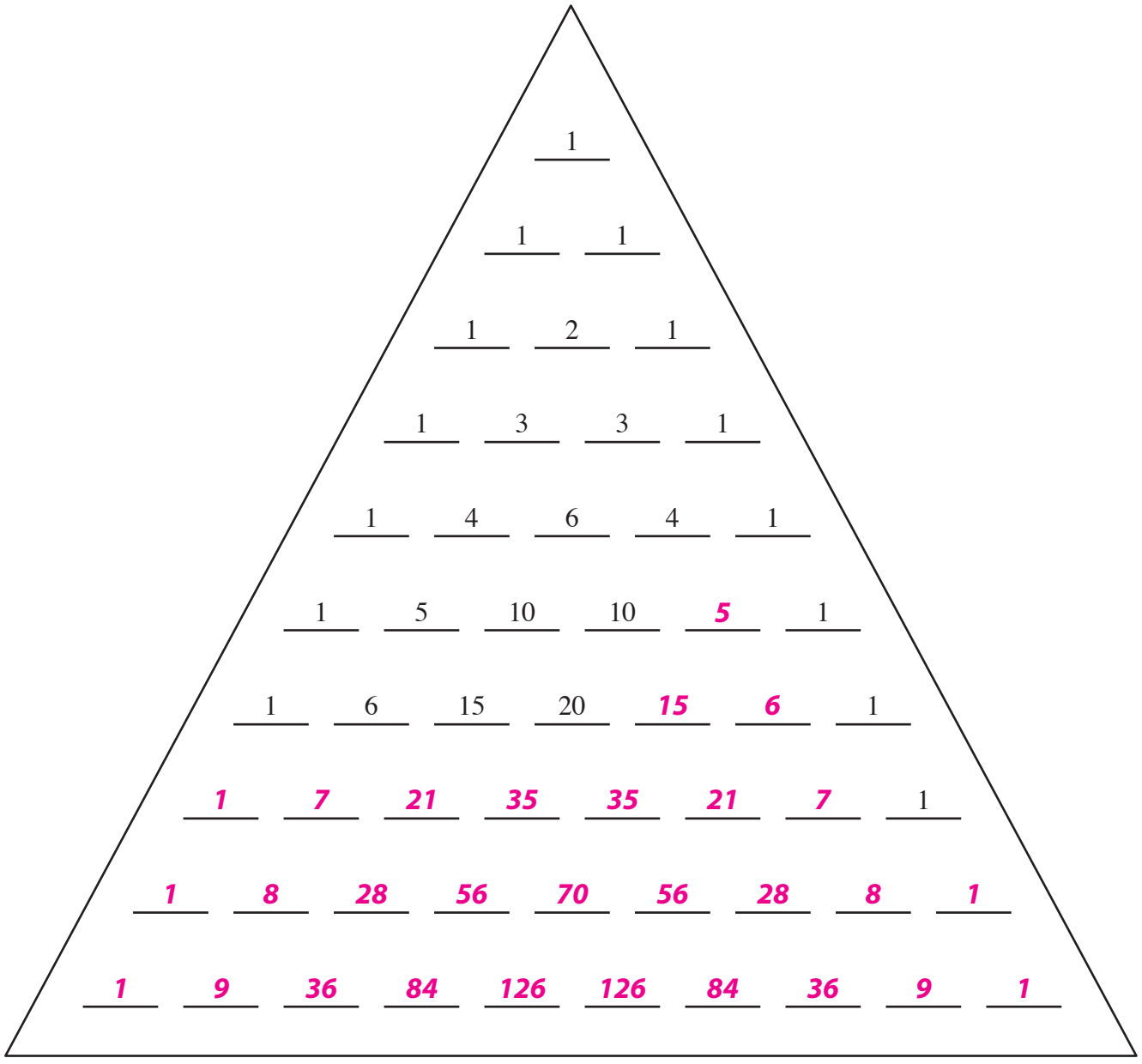
Day	Starting depth	Depth shoveled	Depth at end of day	Amount covered by sand
1	0	30 inches	30 inches	8 inches
2	22 inches	*11 inches*	*33 inches*	*8 inches*
3	*25 inches*	*13 inches*	*38 inches*	*10 inches*
4	*28 inches*	*14 inches*	*42 inches*	*11 inches*
5	*31 inches*	*16 inches*	*47 inches*	*12 inches*
6	*35 inches*	*18 inches*	*53 inches*	*13 inches*
7	*40 inches*	*20 inches*	*60 inches*	*treasure found*
8				
9				

On which day will the sailor reach the buried treasure? *Day 7*

Triangle Pattern

Name _____

The numbers in this triangle form a pattern. Add more numbers by following the pattern. This pattern of numbers was discovered by a mathematician named Pascal. We call it Pascal's Triangle.



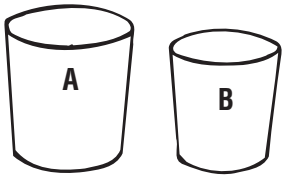
Guess & Check

Name _____

David has a bucket that holds 5 gallons and a bucket that holds 3 gallons. He needs exactly 1 gallon of water. How can he use the two buckets to measure out exactly 1 gallon?

Follow these steps:

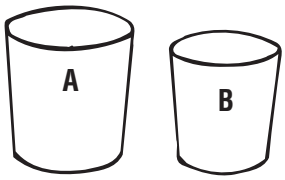
	A	B
1. Fill bucket B.	0	3
2. Pour B into A.	3	0
3. Fill bucket B again.	3	3
4. Pour B into A to fill A.	5	(1)



1 gallon is left in bucket B!

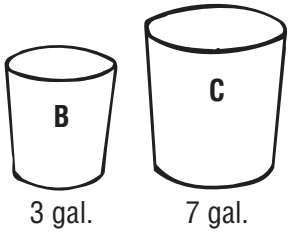
Write the steps needed to find the correct amount of water.

1. Carolyn has bucket A that holds 5 gallons and bucket B that holds 3 gallons. How can she find exactly 4 gallons of water?



	A	B
Fill bucket A.	5	0
Pour A to fill B.	*2*	*3*
Empty B.	*2*	*0*
Pour A into B.	*0*	*2*
Fill A.	*5*	*2*
Pour A to fill B.	(*4*)	*3*

2. Victor has bucket B that holds 3 gallons and bucket C that holds 7 gallons. How can he find exactly 5 gallons of water?



	B	C
Fill bucket B.	*3*	*0*
Pour B into C.	*0*	*3*
Fill B.	*3*	*3*
Pour B into C.	*0*	*6*
Fill B.	*3*	*6*
Pour B to fill C.	*2*	*7*
Empty C.	*2*	*0*
Pour B into C.	*0*	*2*
Fill B.	*3*	*2*
Pour B into C.	*0*	(*5*)

Library Logic

Name _____

Four friends visited the library to check out books. The computer was down, so Miss Smith wrote on a piece of paper the names of the children and the book checked out by each one. A gust of wind carried the paper out the door and down the street! Miss Smith will have to rely on her memory to determine which child checked out which book!

Use the clues to determine which child checked out each book.

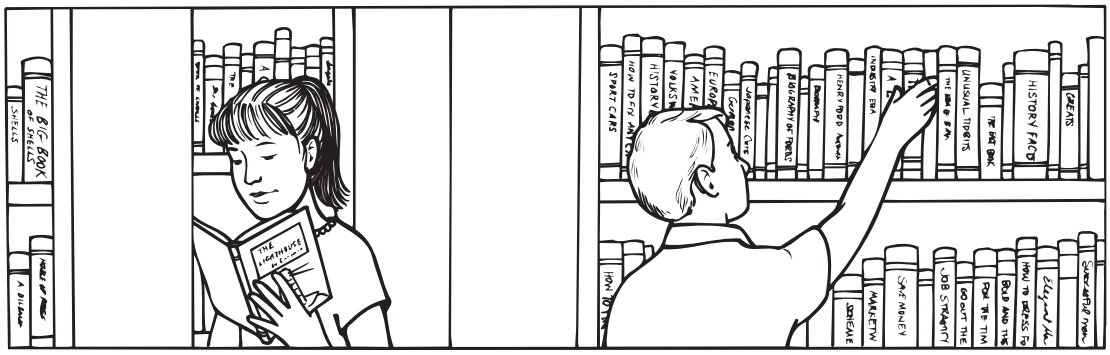
1. The redhead does not read fanciful fiction or biographies.
2. Ben's friend has blond hair and reads mysteries.
3. Tony does not have red or brown hair.
4. Jenni does not like to read adventure stories, but her sister reads mysteries.
5. The child with black hair checked out a biography.

	fanciful fiction	mystery	biography	adventure	red	brown	blond	black
Jenni	O	X	X	X	X	O	X	X
Mary	X	O	X	X	X	X	O	X
Ben	X	X	X	O	O	X	X	X
Tony	X	X	O	X	X	X	X	O
red	X	X	X	O				
brown	O	X	X	X				
blond	X	O	X	X				
black	X	X	O	X				

Draw a line to match each child's name with the correct book title. Write the child's hair color in the blank.

1. _____brown_____ Jenni
2. _____blond_____ Mary
3. _____red_____ Ben
4. _____black_____ Tony

a. *Nothing Daunted* (biography)
b. *Scout* (adventure)
c. *Night Flight* (mystery)
d. *The Bridge* (fanciful fiction)



Used Car Lot

Name _____

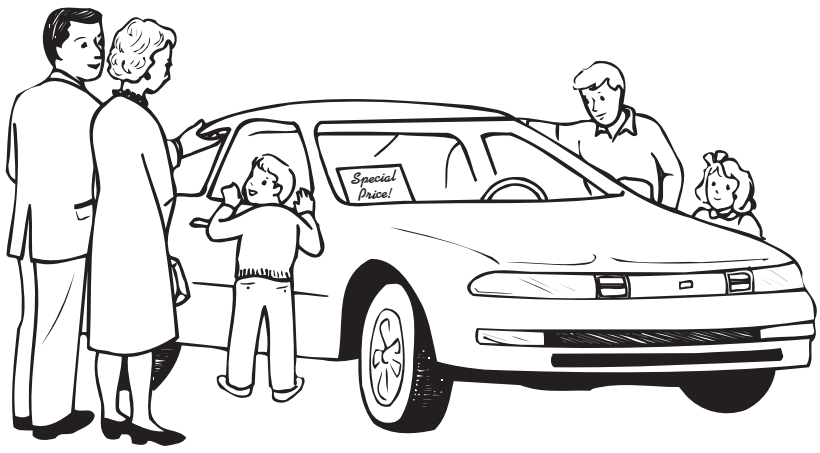
Four families were shopping for cars at a used car lot. A chart is provided to help you determine which family bought which car.

Place an *X* in a square to eliminate a choice, and an *O* in the square of the correct choice. Fill in the blanks.

	Dodge	Ford	Toyota	Nissan	red	gray	green	blue
Carter	X	X	X	O	X	O	X	X
Olsen	O	X	X	X	X	X	O	X
Fry	X	X	O	X	X	X	X	O
King	X	O	X	X	O	X	X	X
red	X	O	X	X				
gray	X	X	X	O				
green	O	X	X	X				
blue	X	X	O	X				

- The Olsens' car is not blue.
- The name of the Kings' car has the same number of letters as their last name.
- The Carters did not buy the green Dodge or the blue Toyota.
- The Frys' neighbors bought the red Ford.

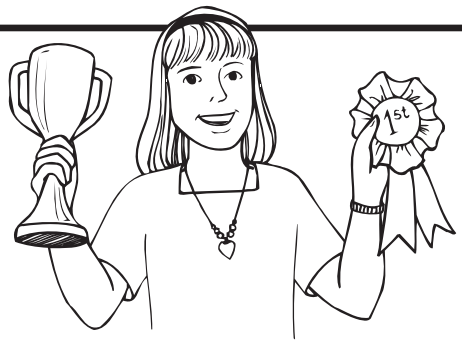
1. The Carters bought the Nissan.
2. The Olsens bought the Dodge.
3. The Frys bought the Toyota.
4. The Kings bought the Ford.
5. The Ford is red.
6. The Nissan is gray.
7. The Dodge is green.
8. The Toyota is blue.



Super Square!

Name _____

Use the numbers 1, 2, 3, 4, and 5 to complete the square. Write one of these numbers in each of the small squares. No number should appear more than once in any row, column, or diagonal. You can do it!



1	2	3	4	5
4	5	1	2	3
2	3	4	5	1
5	1	2	3	4
3	4	5	1	2

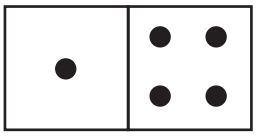
1. How many times did you use each number? 5
2. What is the sum of the digits of each row? 15
3. What is the sum of the digits of each column? 15
4. What is the sum of the digits of each diagonal? 15

Square Numbers

Name _____

Objects can be arranged in square formations. The number of objects in these formations is called a *square number*.

1 row 2 rows



3 rows

X	O	X
O	O	X
O	X	X

4 rows

16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1

Notice: in this magic square the sum of every row, column, and diagonal is 34.

Fill in the missing numbers in the table. Answer the questions.

Number of rows	1	2	3	4	5	6	7
Number of objects	1	4	*9*	*16*	*25*	*36*	*49*

1. What is the pattern for the increase in the square numbers?

   Add the next odd number.

2. Using that pattern, list the next 10 square numbers.

   64 *81* *100* *121* *144* *169* *196* *225* *256* *289*

3. What number between 1 and 100 is both a triangle number and a square number? *36*
   (A triangle number is a number that can be shown as objects arranged in the shape of a triangle.)

Solve the problems. You may choose to draw a diagram on a separate sheet of paper. Your teacher may allow you to use a calculator.

4. Mrs. Bradley has 74 thimbles in her collection. She wants to display the collection in 2 square formations. How many thimbles will be in each formation?

   25 *49*

5. Mr. Bradley has 196 coins in his collection. If he displays the coins in a square formation, how many coins will be in each row?

   14 coins

6. There are 256 musicians in the state honor band. Mr. Opfer will arrange them in a square formation for the parade. How many musicians will be in each row?

   16 musicians

How Old Am I?

Name _____

Answer the questions. Solve the problems on a separate sheet of paper.

1. If you multiply Tia's age by 6 and add 16, the result is 100. How old is Tia?

   14 years

2. Janine is 8 years older than Alex. Alex is 9 years younger than Ted. If Janine is 25 years old, how old is Ted?

   26 years

3. Eight years from now, Joanie will be 20 years old. In what year was she born?

   Answers will vary. 12 years prior to current year.

4. Jayne and Carrie share the same birthday. Carrie is 3 years older than Jayne. They each had a cake with the same number of candles as their age. There were 35 candles in all. How old are Jayne and Carrie?

   Carrie 19 years; Jayne 16 years

5. Mr. and Mrs. Reynolds have the same birthday. When they were married their combined age was 45. They have been married 38 years, and their combined age now is 121. Mr. Reynolds is 5 years older than his wife. How old were they when they married? How old are they now?

   20 and 25 years when married; 58 years and 63 years now

6. Mrs. Ballard was 32 years old when the youngest of her 6 children was born. At the baby's first birthday party, the oldest child announced that she was 8 times as old as the baby. The second child is $\frac{3}{4}$ the age of the oldest child. The third child is half the age of the oldest child. The fourth child is half the age of the second child, and the fifth child is $\frac{1}{11}$ of her mother's age. Mr. Ballard is 9 times the age of the third child. How old is each member of the family?

Mr. Ballard: *36*	Mrs. Ballard: *33*
child 1: *8*	child 2: *6*
child 3: *4*	child 4: *3*
child 5: *3*	child 6: *1*

Note: The 4th and 5th children are twins.