Year 7 Mathematics Solutions

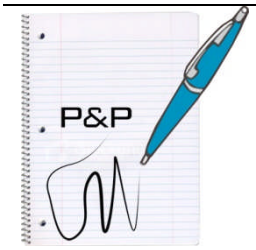
Learning Strategies

Mathematics is often the most challenging subject for students. Much of the trouble comes from the fact that mathematics is about logical thinking, not memorizing rules or remembering formulas. It requires a different style of thinking than other subjects. The students who seem to be "naturally" good at math just happen to adopt the correct strategies of thinking that math requires – often they don't even realise it. We have isolated several key learning strategies used by successful maths students and have made icons to represent them. These icons are distributed throughout the book in order to remind students to adopt these necessary learning strategies:

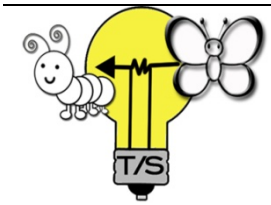
Talk Aloud Many students sit and try to do a problem in complete silence inside their heads. They think that solutions just pop into the heads of 'smart' people. You absolutely must learn to talk aloud and listen to yourself, literally to talk yourself through a problem. Successful students do this without realising. It helps to structure your thoughts while helping your tutor understand the way you think.

BackChecking This means that you will be doing every step of the question twice, as you work your way through the question to ensure no silly mistakes. For example with this question: $3 \times 2 - 5 \times 7$ you would do "3 times 2 is 5 ... let me check – no 3×2 is 6 ... minus 5 times 7 is minus 35 ... let me check ... minus 5×7 is minus 35. Initially, this may seem time-consuming, but once it is automatic, a great deal of time and marks will be saved.

Avoid Cosmetic Surgery Do not write over old answers since this often results in repeated mistakes or actually erasing the correct answer. When you make mistakes just put one line through the mistake rather than scribbling it out. This helps reduce silly mistakes and makes your work look cleaner and easier to backcheck.



Pen to Paper It is always wise to write things down as you work your way through a problem, in order to keep track of good ideas and to see concepts on paper instead of in your head. This makes it easier to work out the next step in the problem. Harder maths problems cannot be solved in your head alone – put your ideas on paper as soon as you have them – always!



Transfer Skills This strategy is more advanced. It is the skill of making up a simpler question and then transferring those ideas to a more complex question with which you are having difficulty.

For example if you can't remember how to do long addition because you can't recall exactly how to carry the one: $\begin{array}{r} 5889 \\ +\,4587 \\ \hline \end{array}$ then you may want to try adding numbers which you do know how to calculate that also involve carrying the one: $\begin{array}{r} 5 \\ +\,9 \\ \hline \end{array}$

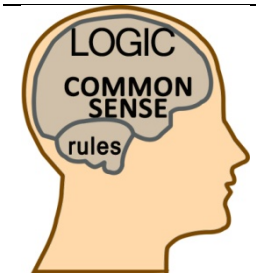
This skill is particularly useful when you can't remember a basic arithmetic or algebraic rule, most of the time you should be able to work it out by creating a simpler version of the question.

Format Skills These are the skills that keep a question together as an organized whole in terms of your working out on paper. An example of this is using the "=" sign correctly to keep a question lined up properly. In numerical calculations format skills help you to align the numbers correctly.

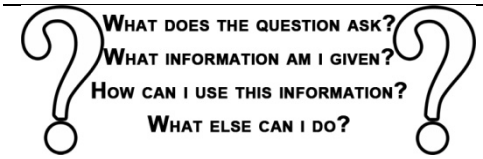
This skill is important because the correct working out will help you avoid careless mistakes. When your work is jumbled up all over the page it is hard for you to make sense of what belongs with what. Your "silly" mistakes would increase. Format skills also make it a lot easier for you to check over your work and to notice/correct any mistakes.

Every topic in math has a way of being written with correct formatting. You will be surprised how much smoother mathematics will be once you learn this skill. Whenever you are unsure you should always ask your tutor or teacher.

Its Ok To Be Wrong Mathematics is in many ways more of a skill than just knowledge. The main skill is problem solving and the only way this can be learned is by thinking hard and making mistakes on the way. As you gain confidence you will naturally worry less about making the mistakes and more about learning from them. Risk trying to solve problems that you are unsure of, this will improve your skill more than anything else. It's ok to be wrong – it is NOT ok to not try.



Avoid Rule Dependency Rules are secondary tools; common sense and logic are primary tools for problem solving and mathematics in general. Ultimately you must understand Why rules work the way they do. Without this you are likely to struggle with tricky problem solving and worded questions. Always rely on your logic and common sense first and on rules second, always ask Why?



Self Questioning This is what strong problem solvers do naturally when they get stuck on a problem or don't know what to do. Ask yourself these questions. They will help to jolt your thinking process; consider just one question at a time and Talk Aloud while putting Pen To Paper.

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Year 7 Mathematics

Number

Exercise 1

Number Groups & Families

1) Express each number as a product of prime numbers

a) 64

$2 \times 2 \times 2 \times 2 \times 2 \times 2$

b) 24

$2 \times 2 \times 2 \times 3$

c) 36

$2 \times 2 \times 3 \times 3$

d) 25

5×5

e) 100

$2 \times 2 \times 5 \times 5$

2) Express the following as a product of prime numbers

a) 112

$2 \times 2 \times 2 \times 2 \times 7$

b) 244

$2 \times 2 \times 61$

c) 33

3×11

d) 113

113

e) 19

19

3) What do you notice about the answers to parts d & e above; what type of numbers are 113 and 19?

19 and 113 have only themselves (and 1) as prime factors. They are prime numbers themselves

4) Express the following in surd form. (e.g.$\sqrt{25} = 5$)

a) $\sqrt{8}$

$2\sqrt{2}$

b) $\sqrt{9}$

3

c) $\sqrt{25}$

5

d) $\sqrt{49}$

7

e) $\sqrt{144}$

12

5) Express the following in simplified form

a) $\sqrt{27}$

$3\sqrt{3}$

b) $\sqrt{12}$

$2\sqrt{3}$

c) $\sqrt{48}$

$4\sqrt{3}$

d) $\sqrt{125}$

$5\sqrt{5}$

e) $\sqrt{256}$

16

6) Express the following in number form

a) $\sqrt{16}$

4

b) $\sqrt{100}$

10

c) $\sqrt[4]{16}$

2

d) $\sqrt[3]{1}$

1

e) $\sqrt[5]{32}$

2

7) Evaluate the following

a) $240 \div 20$

12

b) $(240 \div 10) \div 2$

12

c) 17×11

187

d) $(17 \times 10) + 17$

187

e) $660 \div 20$

33

f) $(660 \div 10) \div 2$

33

g) 33×11

363

h) $(33 \times 10) + 33$

363

i) $a \times 11$

$(a \times 10) + a$

j) $a \div 20$

$(a \div 10) \div 2$

8) Evaluate the following

a) 26×15

390

b) 26×5

130

c) 82×5

410

d) 38×15

570

e) 38×5

190

f) 66×15

990

g) 66×5

330

h) $a \times 15 = (a \times 10) + (a \times 5)$

9) Determine if the following numbers can be divided by 3

a) 245

No

b) 771

Yes

c) 909

Yes

d) 427

No

e) 603

Yes

f) 717

Yes

g) 226

No

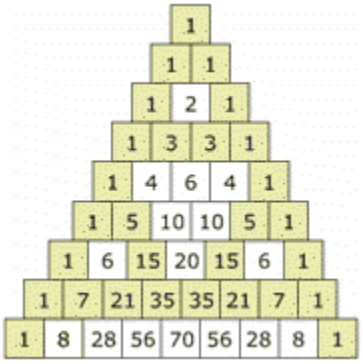
h) 998

No

i) 111

Yes

10) Identify what famous number pattern is shown in the following diagram



Pascal's Triangle

a) Describe a relationship between a number in any row and the two numbers above it

Any number is the sum of the two numbers on the line above it (28 = 21 + 7)

b) Use your answer to part a to write the next row of the triangle

1, 9, 36, 84, 126, 126, 84, 36, 9, 1

c) The first diagonal from the top consists of all 1's. The next diagonal starting at row 2 consists of the numbers 1, 2, 3, 4, 5..... (the counting numbers); what set of numbers does the third diagonal produce?

The triangular numbers (1, 3, 6, 10, 15, 21, 28)

d) Add each row; what set of numbers are produced?

1, 2, 4, 8, 16, 32, 64, 128, 256

The powers of 2

e) Reading each of the top 5 rows as an actual number (e.g. 14641) what pattern is produced by listing the rows as numbers? (The pattern does continue after the row 14641, but it is slightly more complicated to show)

The numbers are palindromes

f) Add the following sets of numbers

I. 1+4+10
II. 1+6+21
III. 1+3+6+10

15

28

20

Relate your answers to the triangle, use them to identify a pattern within the triangle, and use it to add the following numbers (without calculation)

1+3+6+10+15+21

56 by following the shape produced

Exercise 2

Directed Numbers

1) Draw a number line and place these numbers on it

a) 4

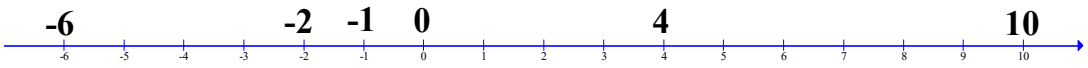
b) -2

c) 0

d) 10

e) -6

f) -1



2) Put the following numbers in order from smallest to largest

-10, 8, 0.5, -2, 0, 3, -9, -6, 6

-10, -9, -6, -2, 0, 0.5, 3, 6, 8

3) Put the following numbers in order from largest to smallest

0, -3, 4, 6, -8, 2.5, -4, -2.5, 11

11, 6, 4, 2.5, 0, -2.5, -3, -4, -8

4) Calculate the following

a) $2 + (-3)$

-1

b) $6 - (-5)$

11

c) $-2 - 7$

-9

d) $-4 — 8$

-12

e) $3 + 8$

11

f) $-8— 3$

-11

g) $2 - (-6)$

8

5) Calculate the following

a) $30 + (-10) - 9$

11

b) $-15 - (-10) + 7$

2

c) $-2 - (-8) - (-10)$

16

d) $4 + 5 + (-15) - (-6)$

0

6) Evaluate the following

a) $2 \times (-5)$

-10

b) -2×5

-10

c) $-2 \times (-5)$

10

d) -6×4

-24

e) $6 \times (-4)$

-24

f) -6×-4

24

7) Complete the following:

a) If you multiply a negative number by a negative number, the answer is always _____

positive

b) If you multiply a negative number by a positive number, the answer is always _____

negative

8) Evaluate the following

a) $-18 \div 6$

-3

b) $-18 \div (-6)$

3

c) $18 \div (-6)$

-3

d) $60 \div (-10)$

-6

e) $-60 \div (-10)$

6

f) $-60 \div (10)$

-6

9) Complete the following:

a) If one of the numbers in a division is negative and the other is positive, the result is always _____

negative

b) If both numbers in a division are negative, the result is always _____

positive

Exercise 3

Fractions

1) Convert the following fractions to quarters

a) $\frac{1}{2}$

$\frac{2}{4}$

b) $\frac{12}{16}$

$\frac{3}{4}$

c) $\frac{3}{12}$

$\frac{1}{4}$

d) $\frac{300}{400}$

$\frac{3}{4}$

2) Convert the following fractions to twelfths

a) $\frac{3}{4}$

$\frac{9}{12}$

b) $\frac{1}{2}$

$\frac{6}{12}$

c) $\frac{2}{3}$

$\frac{8}{12}$

d) $\frac{3}{9}$

$\frac{4}{12}$

e) $\frac{3}{36}$

$\frac{1}{12}$

f) $\frac{1}{6}$

$\frac{2}{12}$

3) Convert the following fractions to their simplest form

a) $\frac{10}{24}$

$\frac{5}{12}$

b) $\frac{6}{9}$

$\frac{2}{3}$

c) $\frac{9}{45}$

$\frac{1}{5}$

d) $\frac{4}{32}$

$\frac{1}{8}$

e) $\frac{8}{36}$

$\frac{2}{9}$

f) $\frac{5}{72}$

Cannot be reduced to a simpler fraction

4) Convert the following mixed numbers to improper fractions

a) $2\frac{1}{3}$

$\frac{7}{3}$

b) $3\frac{1}{2}$

$\frac{7}{2}$

c) $5\frac{2}{3}$

$\frac{17}{3}$

d) $7\frac{3}{5}$

$\frac{38}{5}$

e) $10\frac{1}{4}$

$\frac{41}{4}$

f) $9\frac{4}{5}$

$\frac{49}{5}$

5) Convert the following improper fractions to mixed numbers

a) $\frac{42}{4}$

$10\frac{1}{2}$

b) $\frac{15}{2}$

$7\frac{1}{2}$

c) $\frac{33}{8}$

$4\frac{1}{8}$

d) $\frac{22}{10}$

$2\frac{1}{5}$

e) $\frac{15}{5}$

3

f) $\frac{37}{5}$

$7\frac{2}{5}$

6) Calculate the following

a) $\frac{1}{2} \times \frac{1}{4}$

$$\frac{1}{8}$$

b) $\frac{1}{3} \times \frac{2}{5}$

$$\frac{2}{15}$$

c) $\frac{3}{8} \times \frac{2}{3}$

$$\frac{6}{24} = \frac{1}{4}$$

d) $\frac{3}{4} \times \frac{8}{9}$

$$\frac{24}{36} = \frac{2}{3}$$

e) $\frac{1}{5} \times \frac{2}{5}$

$$\frac{2}{25}$$

f) $\frac{1}{3} \times \frac{5}{6}$

$$\frac{5}{18}$$

g) $\frac{3}{4} \times \frac{1}{9}$

$$\frac{3}{36} = \frac{1}{12}$$

7) Calculate the following

a) $\frac{2}{3} \div \frac{4}{9}$

$$= \frac{2}{3} \times \frac{9}{4} = \frac{18}{12} = 1\frac{1}{2}$$

b) $\frac{1}{5} \div \frac{7}{10}$

$$= \frac{1}{5} \times \frac{10}{7} = \frac{10}{35} = \frac{2}{7}$$

c) $\frac{3}{7} \div \frac{9}{10}$

$$= \frac{3}{7} \times \frac{10}{9} = \frac{30}{63} = \frac{10}{21}$$

d) $\frac{1}{2} \div \frac{3}{8}$

$$= \frac{1}{2} \times \frac{8}{3} = \frac{8}{6} = 1\frac{1}{3}$$

e) $\frac{5}{6} \div \frac{15}{18}$

$$= \frac{5}{6} \times \frac{18}{15} = \frac{90}{90} = 1$$

f) $\frac{2}{5} \div \frac{4}{15}$

$$= \frac{2}{5} \times \frac{15}{4} = \frac{30}{20} = 1\frac{1}{2}$$

8) Two friends buy two pizzas. Tom eats a quarter of all the pieces, then David eats a half of what's left. What fraction of all the pieces remains? Check your answer by assuming there are 8 pieces in each pizza

If Tom eats $\frac{1}{4}$ of all the pieces, then there are $\frac{3}{4}$ of the pieces remaining. David eats half of these, which is $\frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$. Between them they have eaten $\frac{1}{4} + \frac{3}{8} = \frac{5}{8}$ of all the pieces. Therefore $\frac{3}{8}$ of all the pieces remain.

Checking the answer; if there were 16 pieces to start with, then Tom ate 4, leaving 12. David ate half of these, which is 6 pieces. Between them they ate 10 pieces, which leaves 6.

$\frac{3}{8}$ of $16 = 6$, therefore the answer is correct

9) Three men are rowing a boat back to shore. Peter rows half the distance, Alan rows one-third of the distance remaining, and Brian rows the rest of the way

a) What fraction of the total distance did Brian row?

After Peter rowed, there was still $\frac{1}{2}$ the distance to go

Alan rowed $\frac{1}{3}$ of this distance. $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$. So Alan rowed $\frac{1}{6}$ of the total distance.

To this point Peter and Alan had rowed $\frac{1}{2} + \frac{1}{6} = \frac{4}{6}$ of the total distance

So Brian rowed the other $\frac{2}{6}$ of the distance, which simplifies to $\frac{1}{3}$

b) If the distance in total was 1 and a half kilometres, how far did Alan row?

Alan rowed $\frac{1}{6}$ of $\frac{3}{2}$ km. $\frac{1}{6} \times \frac{3}{2} = \frac{3}{12} = \frac{1}{4}$ of a km

10) Ben spends a quarter of his pocket money on drinks, one third of it on lollies and another third on bus fare.

a) What fraction of his pocket money does he have left?

$\frac{1}{4}+\frac{1}{3}+\frac{1}{3}=\frac{1}{4}+\frac{2}{3}=\frac{11}{12}$, so Ben had $\frac{1}{12}$ of his money left

b) If he received $24 pocket money how much does he have left?

$$\frac{1}{12}\times 24=\$2$$

c) One third of the drinks he bought were for his brother, how much money did he spend on his brother?

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

$$\frac{1}{12}\times\$24=\$2$$

Alternatively, he spent $\frac{1}{4}\times\$24=\$6$ on drinks

For his brother he bought $\frac{1}{3}\times\$2$ worth of drinks

Exercise 4

Fractions, Decimals & Percentages

1) Convert the following fractions to decimals

a) $\frac{1}{2}$

0.5

b) $\frac{1}{4}$

0.25

c) $\frac{1}{5}$

0.2

d) $\frac{3}{10}$

0.3

e) $\frac{3}{4}$

0.75

f) $\frac{3}{5}$

0.6

g) $\frac{23}{100}$

0.23

h) $\frac{3}{100}$

0.03

2) Convert the following decimals to fractions

a) 0.5

$\frac{1}{2}$

b) 0.75

$\frac{3}{4}$

c) 0.4

$\frac{2}{5}$

d) 0.2

$\frac{1}{5}$

e) 0.25

$\frac{1}{4}$

f) 0.01

$\frac{1}{100}$

g) 0.15

$\frac{3}{20}$

h) 0.9

$\frac{9}{10}$

3) Convert the following decimals to percentage

a) 0.3

30%

b) 0.03

3%

c) 0.25

25%

d) 0.12

12%

e) 0.001

0.1%

f) 0.99

99%

g) 0.125

12.5%

h) 1.00

100%

4) Convert the following percentages to decimals

a) 20%

0.2

b) 30%

0.3

c) 2%

0.02

d) 4.5%

0.045

e) 50%

0.5

f) 100%

1

g) 0.1%

0.001

h) ½ %

0.005

5) Convert the following percentages to fractions

a) 40%

$\frac{2}{5}$

b) 50%

$\frac{1}{2}$

c) 25%

$\frac{1}{4}$

d) 12.5%

$\frac{1}{8}$

e) 11%

$\frac{11}{100}$

f) 0.1%

$\frac{1}{1000}$

g) 80%

$\frac{4}{5}$

h) 37.5%

$\frac{375}{1000} = \frac{3}{8}$

6) Convert the following fractions to percentages

a) $\frac{3}{4}$

75%

b) $\frac{1}{2}$

50%

c) $\frac{3}{5}$

60%

d) $\frac{1}{10}$

10%

e) $\frac{11}{1000}$

1.1%

f) $\frac{1}{12}$

8.5%

g) $\frac{1}{8}$

12.5%

h) $\frac{8}{8}$

100%

7) Calculate the following

a) $10\%\ of\ 30$

$$\frac{10}{100} \times 30 = \frac{300}{100} = 3$$

b) $20\%\ of\ 80$

$$\frac{20}{100} \times 80 = \frac{1600}{100} = 16$$

c) $25\%\ of\ 120$

$$\frac{25}{100} \times 120 = \frac{3000}{100} 30 =$$

d) $12.5\%\ of\ 40$

$$\frac{125}{1000} \times 40 = \frac{5000}{1000} = 5$$

e) $1\%\ of\ 400$

$$\frac{1}{100} \times 400 = \frac{400}{100} = 4$$

f) $5\%\ of\ 306$

$$\frac{5}{100} \times 306 = \frac{1530}{100} = 15.3$$

g) $100\%\ of\ 29735$

$$\frac{100}{100} \times 29735 = 29735$$

(100% of any number= that number)

h) $0\%\ of\ 2231324$

$$\frac{0}{100} \times 2231324 = \frac{0}{100} = 0$$

(0% of any number is 0)

8) Ben splits his pocket money up

- 25% goes to entertainment
- 20% goes to bus fare
- 15% goes to food & drinks
- He saves the rest

a) What percentage of his pocket money does he save?

He spends $25\% + 20\% + 15\% = 60\%$. So he saves the other 40%

b) If he receives \$25 pocket money, how much goes on bus fare?

$$20\%\ of\ \$25 = \frac{20}{100} \times 25 = \frac{500}{100} = \$5$$

c) If he receives \$50 pocket money, how much would he spend on food and drinks?

$$15\%\ of\ \$50 = \frac{15}{100} \times 50 = \frac{750}{100} = \$7.50$$

d) If he receives \$40 pocket money, how much would he save?

$$40\%\ of\ \$40 = \frac{40}{100} \times 40 = \frac{1600}{100} = \$16$$

9) Peter spent 60% of his money on a new cricket bat

a) If he had \$70, how much did the bat cost?

$$60\%\ of\ \$70 = \frac{60}{100} \times 70 = \frac{4200}{100} = \$42$$

b) If he spent a further 10% of his original money on gloves, how much money will he have left?

$$10\%\ of\ \$70 = \frac{10}{100} \times 70 = \frac{700}{100} = \$7$$

Total now spent is \$49, leaving \$21

c) If he spent a further 50% of the money he had left on a cricket ball, how much money does he now have?

Spending 50% means he has 50% left over. $50\%\ of\ \$21 = \frac{50}{100} \times 21 = \frac{1050}{100} = \$10.50$

10) An item was on sale for \$60, but John did not have enough money to buy it. The shop assistant said he could reduce the price by 10%

a) How much was the shop assistant going to reduce the price by?

$$10\%\ of\ \$60 = \frac{10}{100} \times 60 = \frac{600}{100} = \$6$$

b) If John had only \$48 could he afford the item after the price was reduced?

The new price was $\$60 - \$6 = \$54$, so he could still not afford it

c) What percentage would the original price have to be reduced by for John to be able to buy it?

The price would have to be reduced by \$12 in total

Working backwards $\$12 = \frac{1200}{100} = \frac{}{100} \times 60$

The missing number is 20, therefore the price would have to be reduced by 20%

Exercise 5

Ratios

1) Put the following ratios in their simplest form

a) 5:10

1:2

b) 75:100

3:4

c) 10:40

1:4

d) 9:99

1:11

e) 6:10

3:5

f) 2:5

Already in simplest form

g) 2:100

1:50

h) 10:140

1:14

i) 9:135

1:15

2) A recipe to make 20 cup cakes calls for 250 g of sugar and 4 eggs. If you wanted to make 40 cup cakes how much sugar and how many eggs should you use?

Require double the number of cakes, so double the ingredients. So 500 g of sugar and 8 eggs are required

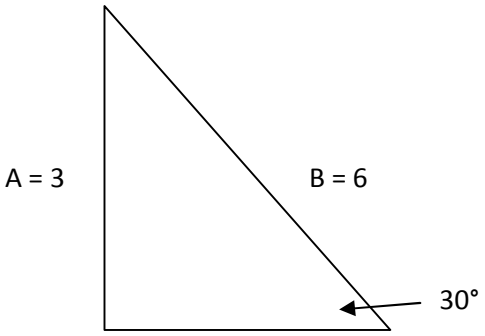
3) A science experiment calls for two chemical: A and B, to be mixed in the ratio 3:5. If you put in 600 g of chemical A, how much of chemical B should you add?

There are 8 parts in total; three parts of A and 5 parts of B, 600 g = 3 parts.

Therefore 1 part $= \frac{600}{3} = 200$ g

So the parts of B $= 200 \times 5 = 1000$ g = 1 kg of chemical B

4) Consider the following diagram of a right angled triangle.



If the angle indicated is always 30°, the ratio of the lengths of sides A and B is always the same

a) If the length of side A was 5, what would the length of side B be?

B is double A, so its length would be 10

b) If the length of side B was 12, what would the length of side A be?

A is half of B, so its length would be 6

c) If you saw a diagram of a right angled triangle with the length of side A being 15 cm, and the length of side B being 30 cm, what could you say about the angle opposite side A?

The angle must be 30° for the ratio between the sides to be 1:2

5) The ratio of the number of stamps in John's collection to the number of stamps in Mark's collection is 7:4.

a) If John has 49 stamps, how many does Mark have?

49 stamps = 7 parts, so 1 part = 7 stamps

Therefore Mark's 4 parts $= 4 \times 7 = 28$ stamps

b) If Mark has 56 stamps, how many does John have?

56 stamps = 4 parts, so 1 part = 14 stamps

Therefore John's 7 parts $= 7 \times 14 = 98$ stamps

c) If together they have 99 stamps, how many do they each have?

There are 11 parts in total, so 1 part = 9 stamps

Therefore John has $7 \times 9 = 63$ stamps

Mark has $4 \times 9 = 36$ stamps

(Check 36 + 63 = 99)

6) The ratio of blue jelly beans to white jelly beans in a packet is 2:5

a) If there were 30 white jelly beans in a packet, how many blue ones would there be?

30 white jelly beans = 5 parts, so 1 part = 6 jelly beans

Therefore the number of blue jelly beans $= 2 \times 6 = 12$

b) If there were 20 blue jelly beans in a packet, how many white ones would there be?

20 blue jelly beans = 2 parts, so 1 part = 10 jelly beans

Therefore the number of white jelly beans $= 5 \times 10 = 50$

c) If there were originally 35 jelly beans in the packet, and 25 white ones were added, what would the new ratio be?

The original 35 jelly beans would have been 2 parts blue and 5 parts white. There were a total of 7 parts, so each part = 5 jelly beans

Therefore originally there would have been 10 blue and 25 white

The new quantities are 10 blue and (25 + 25 = 50) white jelly beans

There are now 60 jelly beans; 10 are blue and 50 are white

The ratio is 10:50, which simplifies to 1:5

7) A recipe has the following ingredients to make 50 scones:

- 2 cups flour
- 500 g butter
- 100 g sugar
- 5 eggs
- 1 litre water

a) How much butter would be needed to make 100 scones?

Doubling the number of scones means doubling the butter. So 1 kg of butter would be needed

b) How many cups of flour would be needed to make 125 scones?

$125 = 2\frac{1}{2} \times 50$

Therefore the amount of flour needed would be $2\frac{1}{2} \times 2 = 5$ cups

c) If 8 eggs were used, how much sugar would be needed?

There would be $\frac{8}{5}$ the amount of eggs used.

Therefore there would be $\frac{8}{5} \times 100$ =160 g of sugar needed

d) How many eggs would need to be used to make 75 scones?

There would be $1\frac{1}{2}$ times the number of scones

Therefore there would be $1\frac{1}{2} \times 5 = 7\frac{1}{2}$ eggs needed

Would have to use 8 eggs, since cannot get “half an egg”

Exercise 6

Probability

1) A card is chosen at random from a standard pack, and its suit is noted. List the sample space for this event

Hearts, Diamonds, Clubs, Spades

2) A coin is tossed and a dice is rolled. List the sample space for this event

Head and 1, head and 2, head and 3, head and 4, head and 5, head and 6, tail and 1, tail and 2, tail and 3, tail and 4, tail and 5, tail and 6

3) Two dice are rolled, and their sum is noted. List the sample space for this event.

2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

4) What is the probability of each of the following events occurring?

a) A coin is tossed and comes up heads

$\frac{1}{2}$

b) A card chosen from a standard pack is a diamond

$\frac{13}{52} = \frac{1}{4}$

c) A 5 is rolled on a die

$\frac{1}{6}$

d) A 7 is rolled on a die

$\frac{0}{6} = 0$ (impossible)

e) A card chosen from a standard pack is either a red or a black card

$\frac{26}{52} + \frac{26}{52} = \frac{52}{52} = 1$ (certain)

5) There are 3 red socks, 2 blue socks and a white sock in a draw. What is the probability that a sock chosen at random is red?

$\frac{5}{6}$

6) John makes a pack of cards numbered from 1 to 20. What is the probability that a card chosen at random from this pack will be

a) The number 5

$\frac{1}{20}$

b) An even number

$$\frac{10}{20} = \frac{1}{2}$$

c) A number from 1 to 5

$$\frac{5}{20} = \frac{1}{4}$$

d) The number 21

$\frac{0}{20} = 0$ (impossible)

7) There are 40 people in a room. Ten of them are under 20 years old, twenty of them are aged from 20 to 40, and the rest are over forty. What is the probability that a person chosen at random from this group is

a) Under 20 years old

$$\frac{10}{40} = \frac{1}{4}$$

b) Over 40 years old

$$\frac{10}{40} = \frac{1}{4}$$

c) Over 20 years old

$$\frac{30}{40} = \frac{3}{4}$$

d) Under 200 years old

$\frac{40}{40} = 1$ (certain)

8) A fish tank contains 4 guppies, 6 koi and 10 goldfish. What is the probability that a fish chosen at random from the tank will be

a) A goldfish

$$\frac{10}{20} = \frac{1}{2}$$

b) Not a guppy

$$\frac{16}{20} = \frac{4}{5}$$

c) A koi

$$\frac{6}{20} = \frac{3}{10}$$

d) A rainbow fish

$$\frac{0}{20} = 0$$

Year 7 Mathematics

Algebra

Exercise 1

Representing Variables

1) There are a certain number of lollies in a jar, but you don't know how many. If "a" represents the number of lollies in the jar, write an expression that represents:

a) The number of lollies plus one

$a + 1$

b) Four less than the number of lollies

$a - 4$

c) Twice the number of lollies

$2a$

d) Half the number of lollies

$\frac{a}{2}$

e) Twice the number of lollies plus one

$2a + 1$

f) The number of lollies plus one, then this number doubled

$2(a + 1)$

2) If John's age is represented by the variable x, how would the ages of the rest of his family be represented?

a) John's brother is three years older than him

$x + 3$

b) John's sister is half his age

$\frac{x}{2}$

c) John's father is four times his age

$4x$

d) John's mother is three times his age plus five

$3x + 5$

e) If you add two to John's age then multiply this number by five you get the age of John's grandfather

$5(x + 2)$

3) The number of people at a party at 8 o'clock is unknown but can be represented by a variable. For the next three hours 4 people per hour come to the party

a) Represent the number of people at the party at nine o'clock, ten o'clock and eleven o'clock

$x + 4, x + 8, x + 12$

b) By midnight, there was only half the number of people at the party than at 11 o'clock. Represent this amount

$$\frac{x+12}{2}$$

c) By one am there was only half the number of people at the party as there was at 8 o'clock. Represent this number

$$\frac{x}{2}$$

4) Mark and his friends agree to give money to a charity. Represent the contributions of each person in terms of the amount Mark contributes

a) Peter says he will put in $2 more than Mark

$x+2$

b) Frank will put in $5 more than Mark

$x+5$

c) Alan will put in double whatever Frank puts in

$2(x+5)$

d) Jeff will put in double whatever Peter puts in

$2(x+2)$

5) Jack scored highest on the maths test. Represent the following scores in relation to Jack's score

a) Karl scored five less than Jack

$x-5$

b) Tom scored ten less than Jack

$x-10$

c) Daniel scored half Jack's score

$$\frac{x}{2}$$

d) Brian scored three less than Daniel

$$\frac{x}{2}-3$$

e) Fred scored half Karl's score

$$\frac{x-5}{2}$$

6) In the first week of the basketball season a team scored a certain number of points. Each week they performed better than the previous week. Represent each week's scores in terms of their score of the first week.

a) In week two they scored 5 points more than they did in week one

$x + 5$

b) In week three they scored 6 points more than they did in week two

$x + 5 + 6 = x + 11$

c) In week four they scored twice the number of points than they did in week one

$2(x + 5)$

d) In week five they scored double the number of points than they did in week three

$2(x + 11)$

e) What was the total number of points scored in the five weeks?

$x + (x + 5) + (x + 11) + 2(x + 5) + 2(x + 11) = 7x + 48$

7) If y is the age of Peter, what is each of the following expressions describing

a) $y + 1$

Peter's age plus 1 year

b) $y - 2$

Peter's age minus 2 years

c) $y + 5$

Peter's age plus 5 years

d) $2y$

Twice Peter's age

e) $2y + 1$

Twice Peter's age plus 1 year

f) $2(y + 1)$

Peter's age plus 1 year then this amount doubled

g) $\frac{1}{2}y - 4$

Half Peter's age minus 4 years

Exercise 2

Simplifying Expressions

1) Add the following:

a) One bag of apples plus one bag of apples

2 bags of apples

b) One bag of lollies plus one bag of lollies

2 bags of lollies

c) Two piles of bricks plus two piles of bricks

4 piles of bricks

d) Four eggs plus four eggs

8 eggs

e) Four x plus four x

$8x$

f) $4x + 4x$

$8x$

2) Let x represent the number of apples in a bag

a) What is two bags of apples plus two bags of apples?

4 bags of apples

b) What is $2x + 2x$?

$4x$

c) If there are ten apples in a bag, how many apples are there in part a?

$4 \times 10 = 40$

d) If $x = 10$, what is the answer to part b?

$4 \times 10 = 40$

3) Let r represent the number of kilometeres a man walks every day

a) How many kilometres would he walk in 3 days?

$3r$

b) What are 3 lots of r?

$3r$

c) If he walks 5 kilometres per day, how many kilometres would he walk in 3 days?

15 km

d) If $r = 5$, what is the answer to part b?

15

4) How many lots of x are there in total in each of the following?

a) $x + x$

2

b) $x + x + x$

3

c) $2x + x$

3

d) $2x + 2x$

4

e) $2x + 1 + 3x$

5

5) How many lots of x are there in each of the following?

a) $3x - x$

2

b) $3x - 2x$

1

c) $4x - x$

3

d) $5x - 3x$

2

e) $3x - 3x$

0

6) How many lots of r are there in each of the following?

a) $4r + r - 2r$

3

b) $3r - r - r$

1

c) $2r + r - r$

2

d) $\frac{1}{2}r + \frac{1}{2}r$

1

e) $6r - 4r - 2r$

0

7) What is the value of $2x + 2x$ when:

a) $x = 3$

12

b) $x = 2$

8

c) $x = 1$

4

d) $x = \frac{1}{2}$

2

e) $x = 0$

0

8) If x is the number of counters in a row, how many counters are there in 5 rows when $x =$:

a) 2

10

b) 4

20

c) 1

5

d) 10

50

e) 0

0

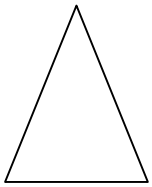
f) 20

100

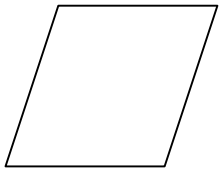
Exercise 3

Geometric Patterns

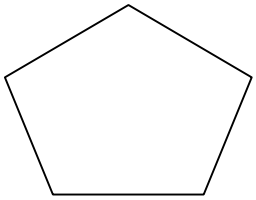
1) Peter is making shapes with matches; he gets three matches and makes a triangle, which has three sides



He adds another match to his shape and makes a quadrilateral, which has four sides



He adds another match to his shape and makes a pentagon, which has five sides



He notices a very simple pattern which he puts into a table

Number of matches used	Number of sides in the shape
3	3
4	4
5	5
6	**6**
7	**7**
8	**8**
9	**9**

a) Complete the table

b) Complete this sentence: "The number of sides in the shape is equal to ....."

The number of matches used

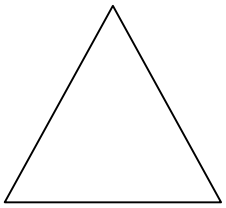
c) If his shape has 100 sides, how many matches has he used?

100

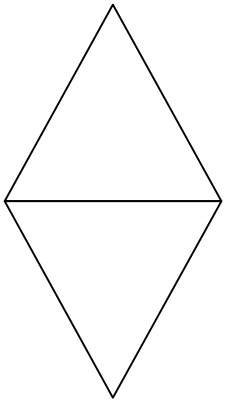
d) If he has used 200 matches, how many sides does his shape have?

200

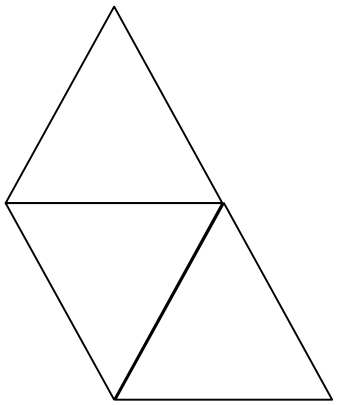
2) Peter uses matches to tessellate triangles. He makes one triangle which uses 3 matches



He adds enough matches so that two triangles are tessellated



He tessellates another triangle



He notices a pattern which he puts into a table

Number of triangles	Number of matches
1	3
2	5
3	7
4	**9**
5	**11**

a) Complete the table

b) Complete the table

Number of triangles	Number of matches	
1	3	$(1 \times 2) + 1$
2	5	$(2 \times 2) + 1$

3	7	$(3 \times 2) + 1$
4	**9**	$\mathbf{(4 \times 2) + 1}$
5	**11**	$\mathbf{(5 \times 2) + 1}$

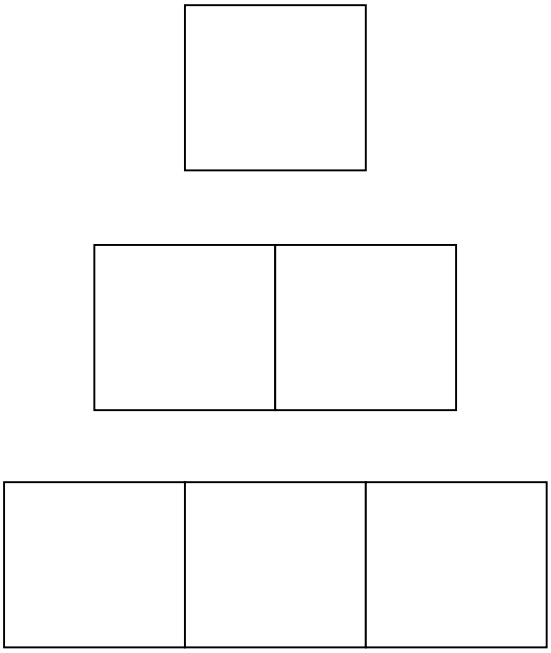
c) Use the table to help complete the sentence: "The number of matches equals the number of triangles. multiplied by ....., then add .....

Two, then add 1

d) Use the rule to predict the number of matches used when 200 triangles are made

Number $= (200 \times 2) + 1 = 401$ matches

3) Peter next makes a pattern of squares



a) Complete the table

Number of squares	Number of matches
1	4
2	7
3	**10**
4	**13**
5	**16**

b) Complete the table

Number of squares	Number of matches	
1	4	$(1 \times 3) + 1$
2	7	$(2 \times 3) + 1$
3	**10**	$\mathbf{(3 \times 3) + 1}$
4	**13**	$\mathbf{(4 \times 3) + 1}$
5	**16**	$\mathbf{(5 \times 3) + 1}$

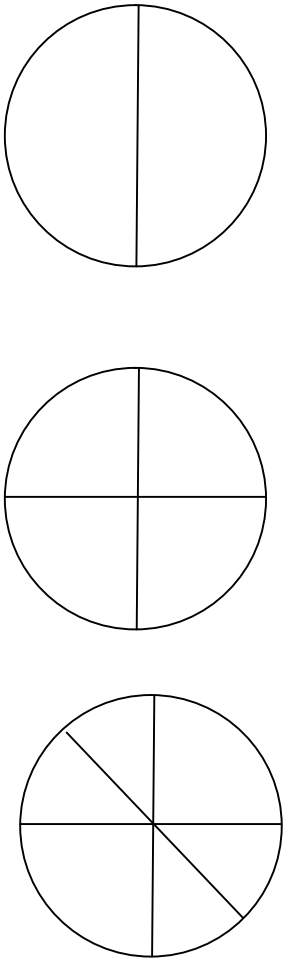
c) Use the table to help complete the sentence: "The number of matches equals ..... multiplied by ....,. then add .....

The number of squares multiplied by three, then add one

d) Use the rule above to find the number of matches used to make 200 squares

$(200 \times 3) + 1 = 601$ matches

4) Peter then cuts a circle into various pieces:



a) Complete the table

Number of cuts	Number of sections
1	2
2	4
3	**6**
4	**8**
5	**10**

b) Complete the sentence: "The number of sections is equal to the number of cuts ....."

Multiplied by twp

c) How many sections will be there be if there are 60 cuts made?

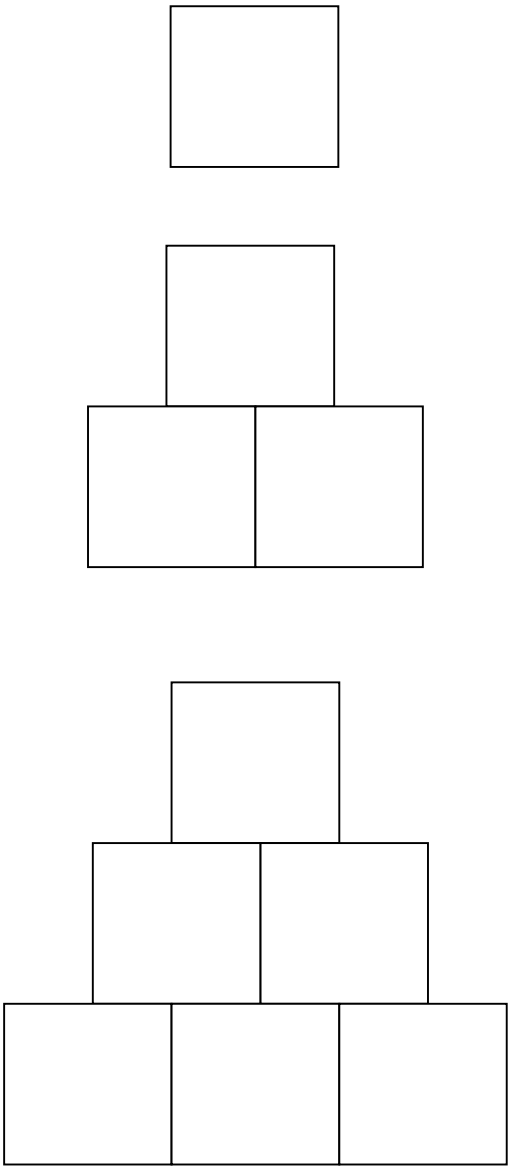
$60 \times 2 = 120$

d) How many cuts are needed to make 180 sections?

Number of cuts x 2 = 180

Need 90 cuts

5) Peter next builds a tower



a) Complete the table

Number of rows	Number of blocks
1	1
2	3
3	6
4	**10**
5	**15**

b) Describe what happens to the number of blocks added to the tower each time a row is added

The number of blocks **in each row** increases by one each time a new row is added

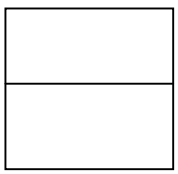
c) How many blocks would be added to the tower in the 6^{th} row?

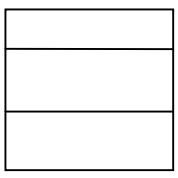
There were 5 extra in the 5^{th} row, so there would be 6 extra in the 6^{th} row

d) How many blocks would be in the tower if it was 7 rows high?

$(15 + 6 + 7) = 28$

6) Peter cuts a block across its length





a) Complete the table

Number of cuts	Number of sections
1	2
2	3
3	**4**
4	**5**
5	**6**

b) The number of sections increases by ..... each time a cut is made

One

c) Describe in words how to work out the number of sections if the number of cuts is known

The number of sections equals the number of cuts plus one

d) Use this rule to calculate how many sections will be made from 95 cuts

$95 + 1 = 96$

e) How many cuts will have been made if there are 133 sections?

Number of cuts + 1 = 133 sections

Number of cuts = 132

Exercise 4

Number Patterns

1) Complete the table

x	1	2	3	4	5	6	7
$x+2$	3	4	5	**6**	**7**	**8**	**9**

2) Complete the table

x	1	2	3	4	5	6	7
$2x$	2	4	6	**8**	**10**	**12**	**14**

3) Complete the table

x	1	2	3	4	5	6	7
$3x-1$	2	5	8	**11**	**14**	**17**	**20**

4) Complete the table, and describe the pattern that relates the numbers in the bottom row to the corresponding number in the top row

1	2	3	4	5	6	7
3	6	9	**12**	**15**	**18**	**21**

The numbers in the bottom row are 3 times the corresponding number in the top row

5) Complete the table, and describe the pattern that relates the numbers in the bottom row to the corresponding number in the top row

1	2	3	4	5	6	7
3	5	7	**9**	**11**	**13**	**15**

The numbers in the bottom row are twice the corresponding number in the top row plus 1

6) Complete the table, and describe the pattern that relates the numbers in the bottom row to the corresponding number in the top row

x	1	2	3	4	5	6	7
????	5	6	7	**8**	**9**	**10**	**11**

The numbers in the bottom row are equal to the corresponding number in the top row plus four

7) Mark's age is twice John's age. How old is Mark if John is

a) 10

$2 \times 10 = 20$

b) 5

$2 \times 5 = 10$

c) 15

$2 \times 15 = 30$

d) 20

$2 \times 20 = 40$

e) How old is John if Mark is 32?

$2 \times$ John's age $= 32$

John is 16

8) Peter has twice the amount of money that Alan has plus 2 dollars. How much money does Peter have if Alan has

a) 8 dollars

$(2 \times 8) + 2 = \$18$

b) 15 dollars

$(2 \times 15) + 2 = \$32$

c) 20 dollars

$(2 \times 20) + 2 = \$42$

d) \$15.50

$(2 \times 15.5) + 2 = \$33$

e) How much money does Alan have if Peter has 12 dollars?

$2 \times$ Alan's money$+2 = \$12$

$2 \times$ Alan's money$= \$10$

Alan has \$5

9) A large bus is allowed to carry three times the number of passengers of a small bus minus one.

(Let x represent the number of passengers the small bus can carry, and y represent the number of passenger the large bus can carry (any variables are suitable))

a) Write this relationship using algebra

$y = 3x - 1$

b) How many passengers can the large bus carry if the small bus can carry 12 passengers?

$(3 \times 12) - 1 = 35$

c) How many passengers can the large bus carry if the small bus can carry 20 passengers?

$(3 \times 20) - 1 = 59$

d) How many passengers can the small bus carry if the large bus can carry 44 passengers?

$3 \times$ number on small bus$-1 = 44$

$3 \times$ number on small bus $= 45$

Number on small bus $= 15$

e) Does the rule work for all numbers of passengers? Explain why not with an example.

No, if there were no passengers on the small bus, the number on the large bus would work out to be -1

10) If you add one to the number of people who are at a soccer game, then double that number, you get the number of people who are at a basketball game

(Let r represent the number of people at the soccer game, and k represent the number of people at the basketball game)

a) Write this relationship using algebra

$k = 2(r + 1)$

b) If there are 40 people at the soccer game how many are there at the basketball game?

$2 \times (40 + 1 = 82)$

c) If there are 100 people at the soccer game, how many people are there at the basketball game?

$2 \times (100 + 1) = 202$

d) If there are 62 people at the basketball game, how many people are there at the soccer game?

$2 \times$(number of people at soccer game +1)$= 62$

Number of people at soccer game$+1 = 31$

Number of people at soccer game $= 30$

e) Can you always work out the number of people at the soccer game if you know the number of people at the basketball game? Explain your answer with an example

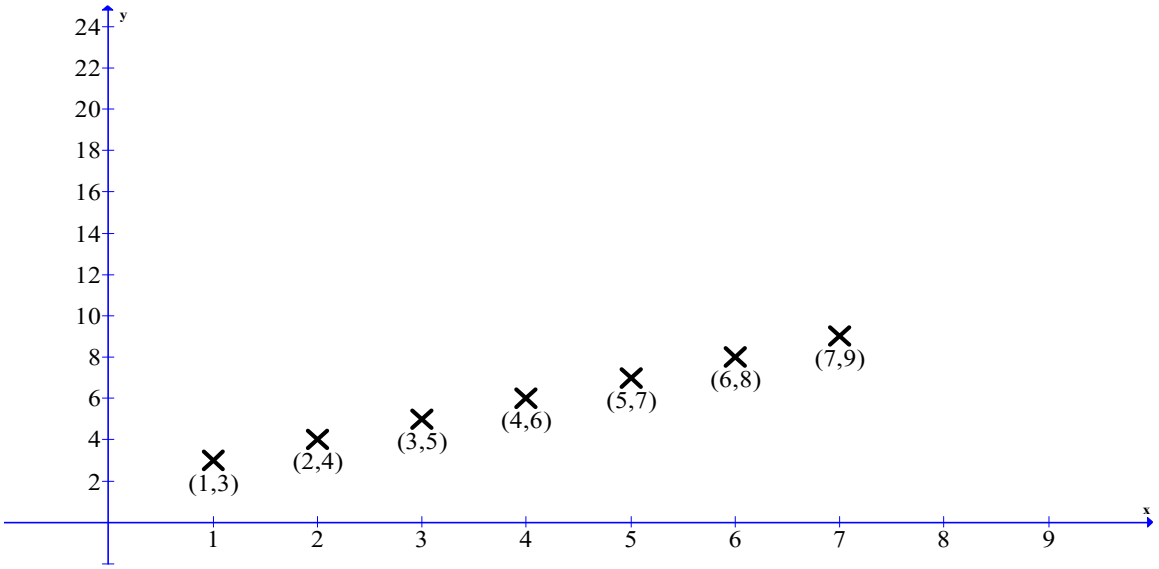
No: If there are an odd number of people of people at the basketball game then this cannot be double any whole number. Therefore the number of people at the soccer game plus 1 would have to equal a non whole number, which means the number of people at the soccer game could not be a whole number using this formula. The formula only works for certain quantities of people

Exercise 5

Graphing Patterns

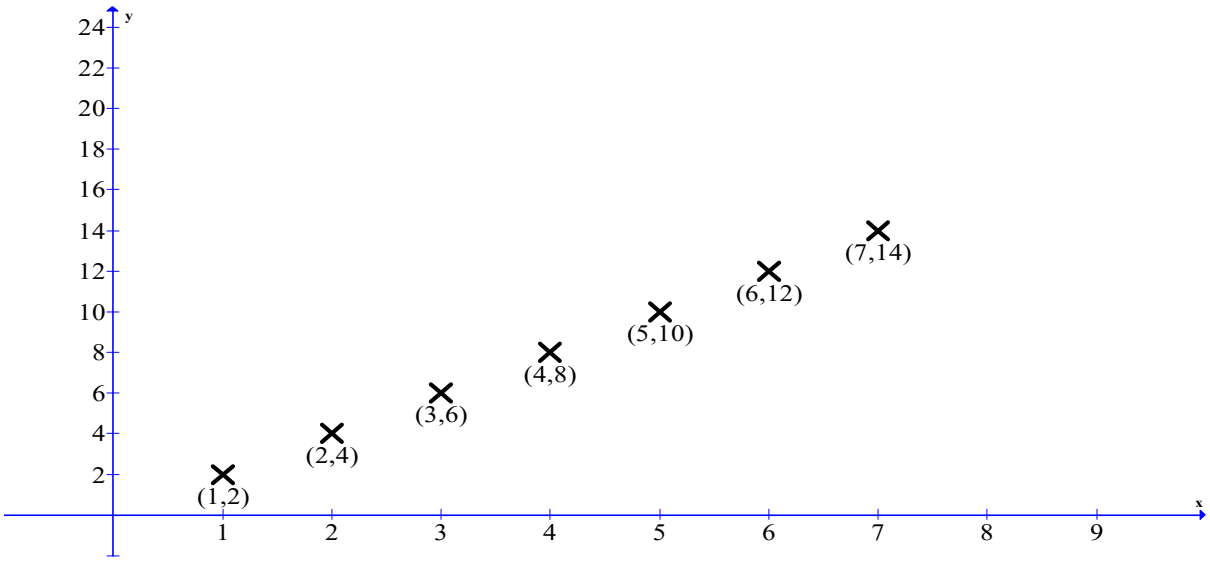
1) Graph the following relationship

x	1	2	3	4	5	6	7
$x+2$	3	4	5				



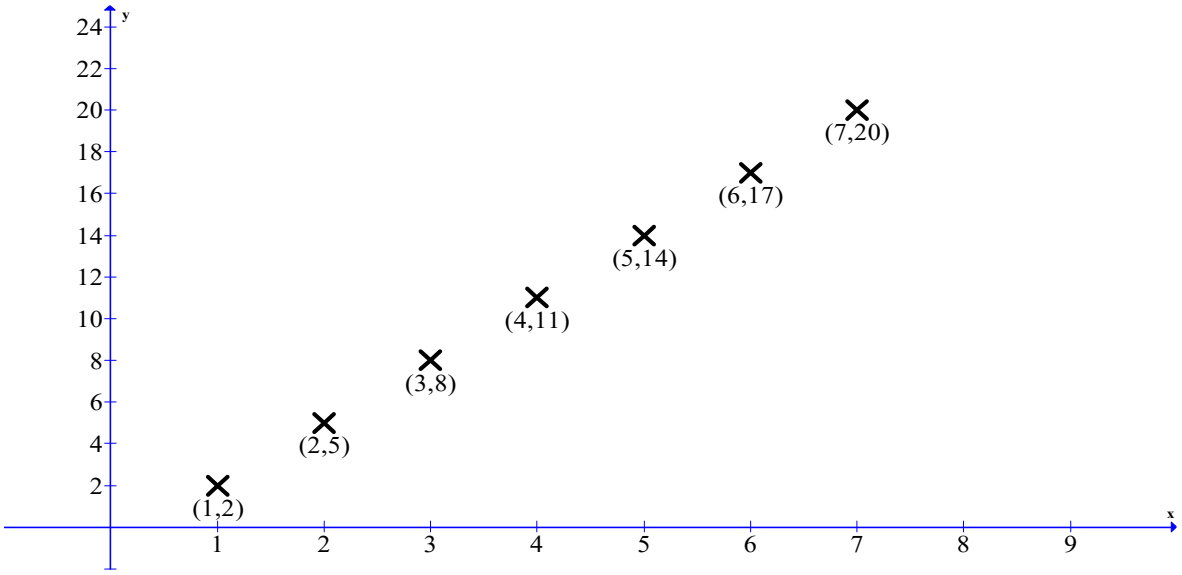
2) Graph the following relationship

x	1	2	3	4	5	6	7
$2x$	2	4	6				



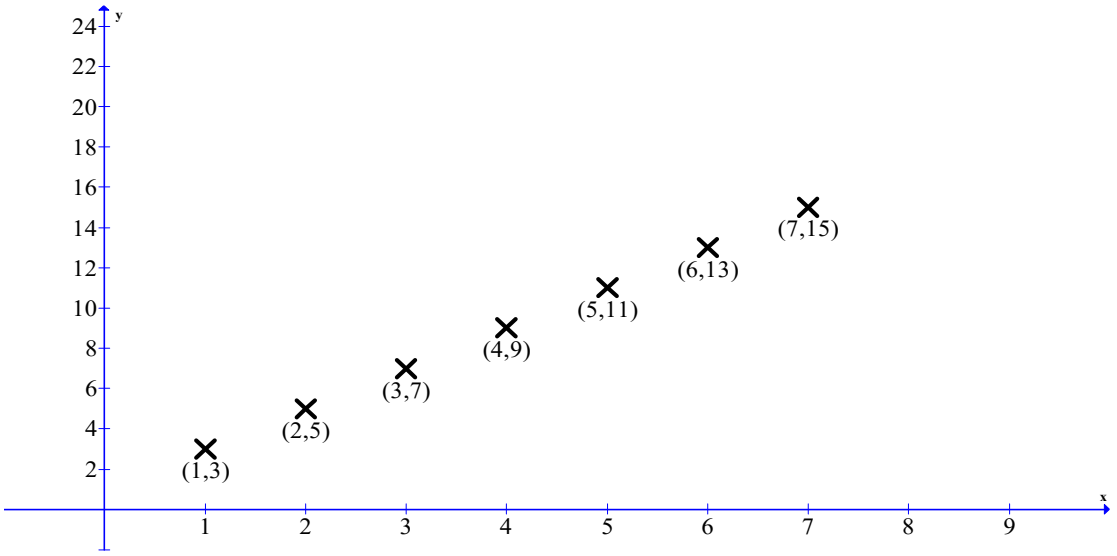
3) Graph the following relationship

x	1	2	3	4	5	6	7
$3x-1$	2	5	8				



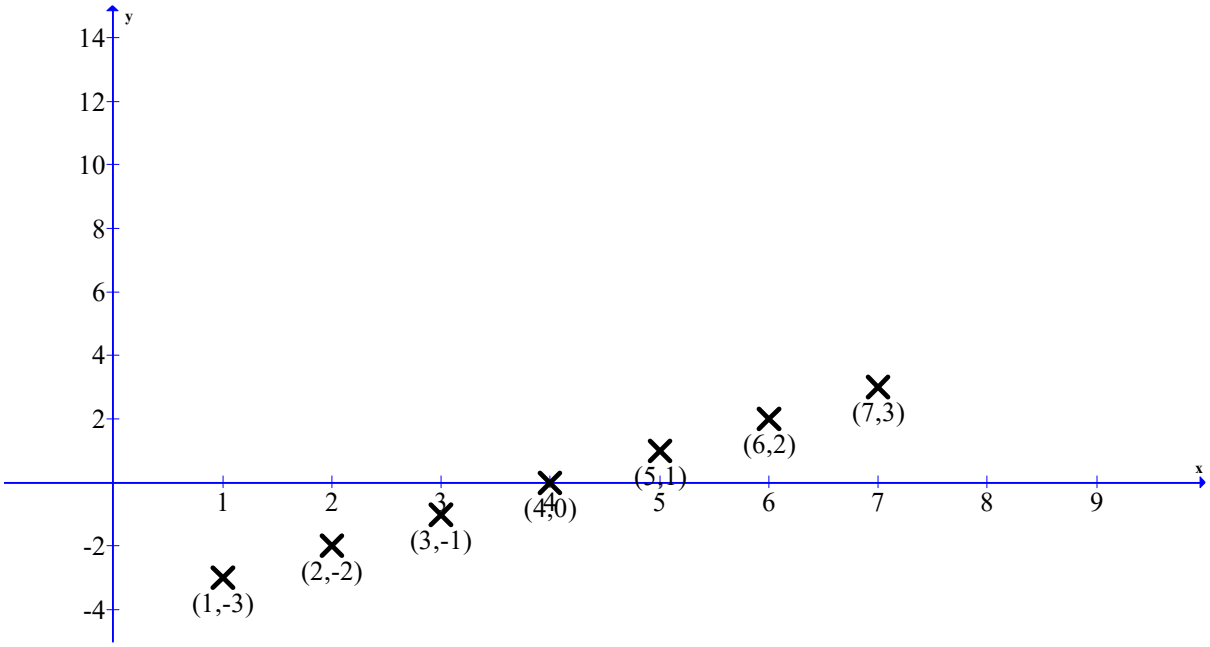
4) Graph the following relationship

x	1	2	3	4	5	6	7
$2x+1$	3	5	7				



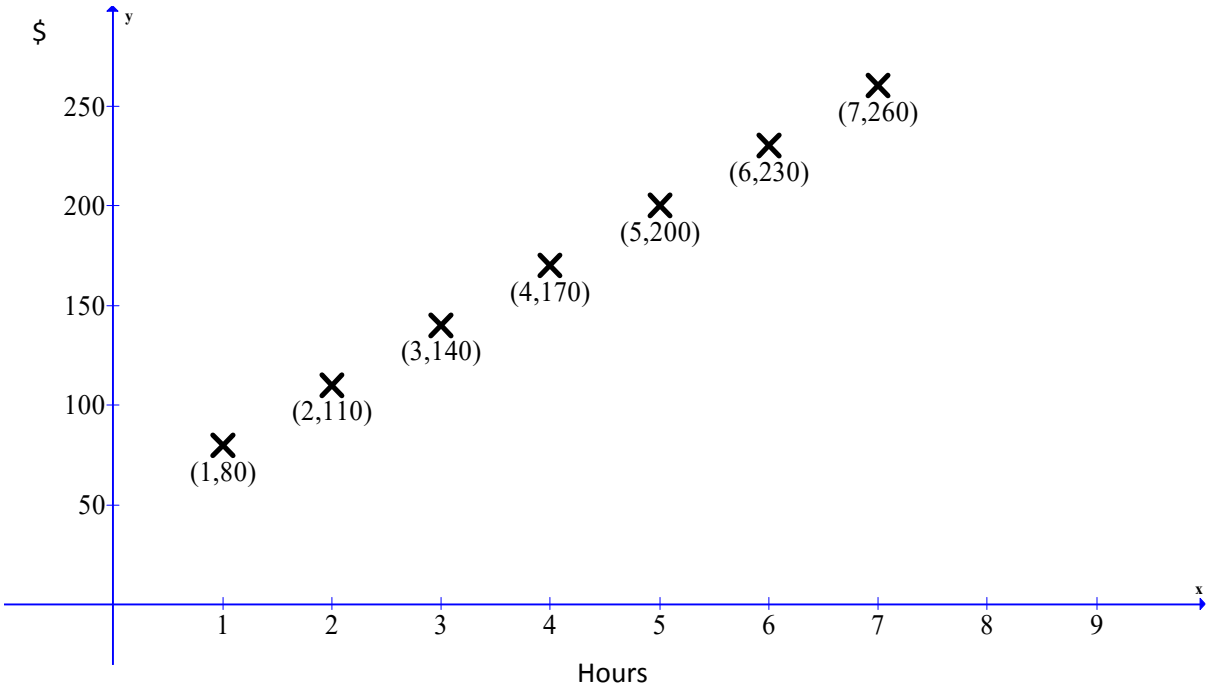
5) Graph the following relationship

x	1	2	3	4	5	6	7
$x-4$	-3	-2	-1				



6) An electrician charges $50 call out fee and $30 per hour for his services
Draw a table showing the amount charged for 1 to 7 hours and graph the relationship using a suitable scale

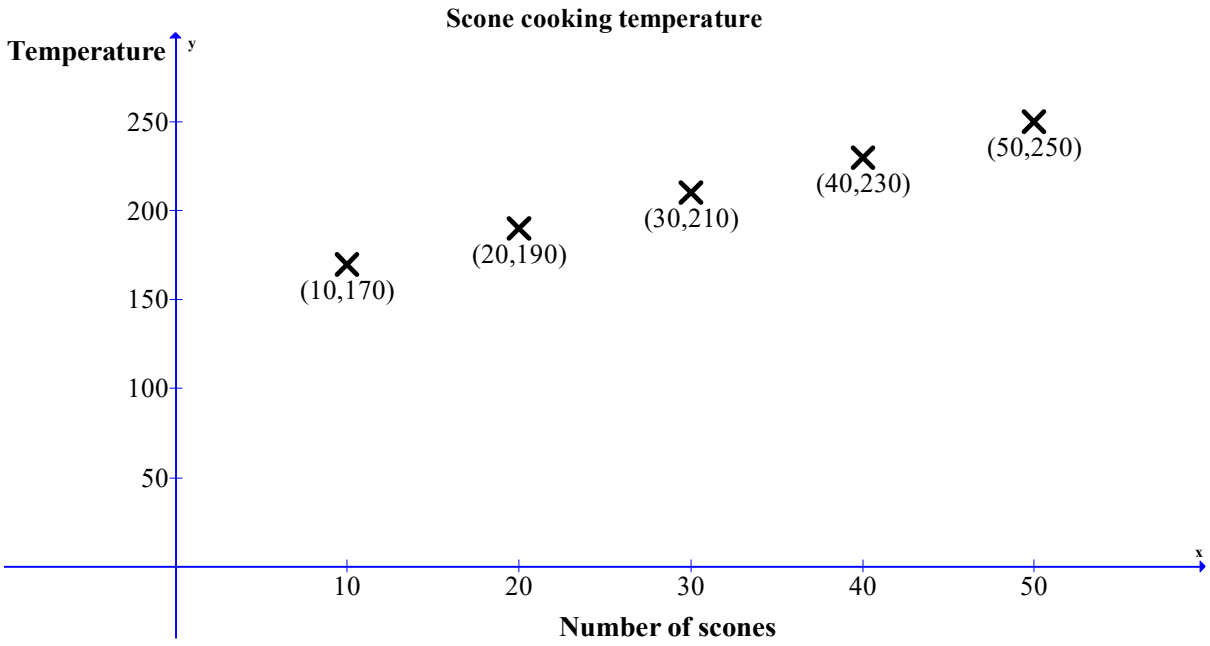
Hours	1	2	3	4	5	6	7
Charge	80	110	140	170	200	230	260



7) When baking scones the oven must be set at 150 degrees Celsius plus 2 degrees extra per scone

Draw a table that shows what temperature an oven must be on to cook 10, 20, 30, 40 and 50 scones and graph the relationship using appropriate scale

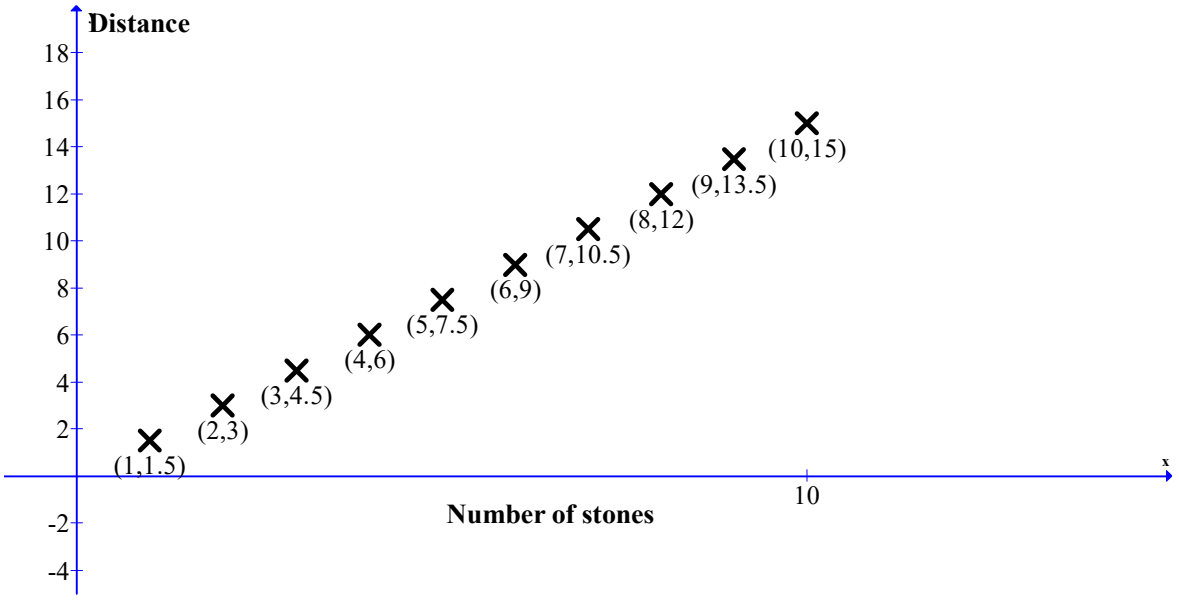
No of scones	10	20	30	40	50
Temperature	170	190	210	230	250



Can the points on the graph be joined up to form a line? Why or why not?

No: although some more points can be plotted, a line cannot be drawn to show the relationship. Not all values of scones are valid. For example, what is the temperature to bake 2 and a half scones, or 105.345 scones?

8) A river has a stepping stone every 1.5 metres. Draw a table showing the relationship between the number of stones and the distance travelled across the river. Draw a graph that shows the relationship. Explain why the points should not be joined to form a line



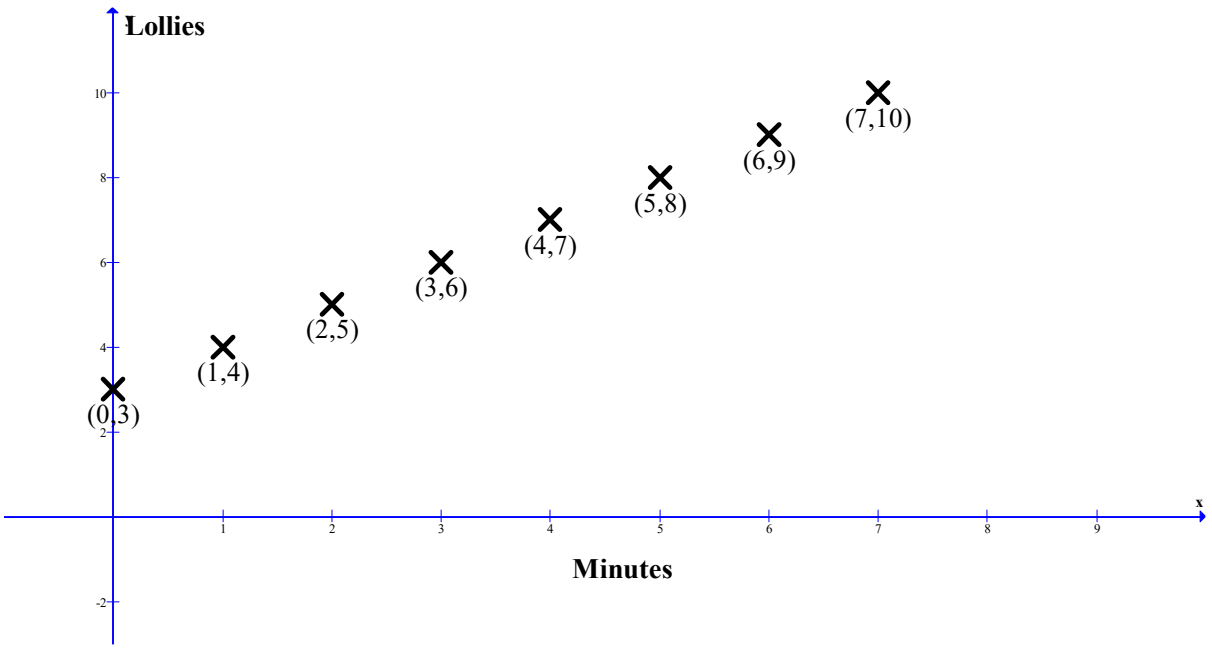
The points cannot be joined since there cannot be a distance corresponding half a stepping stone for example; the distance is only valid for whole numbers of stones

9) A boy places three lollies into a jar. Every minute he puts in another lolly.

a) Draw a table that shows how many lollies in the jar after each minute

Minutes	1	2	3	4	5	6	7
Lollies	4	5	6	7	8	9	10

b) Graph the relationship



c) Explain why the points should not be joined

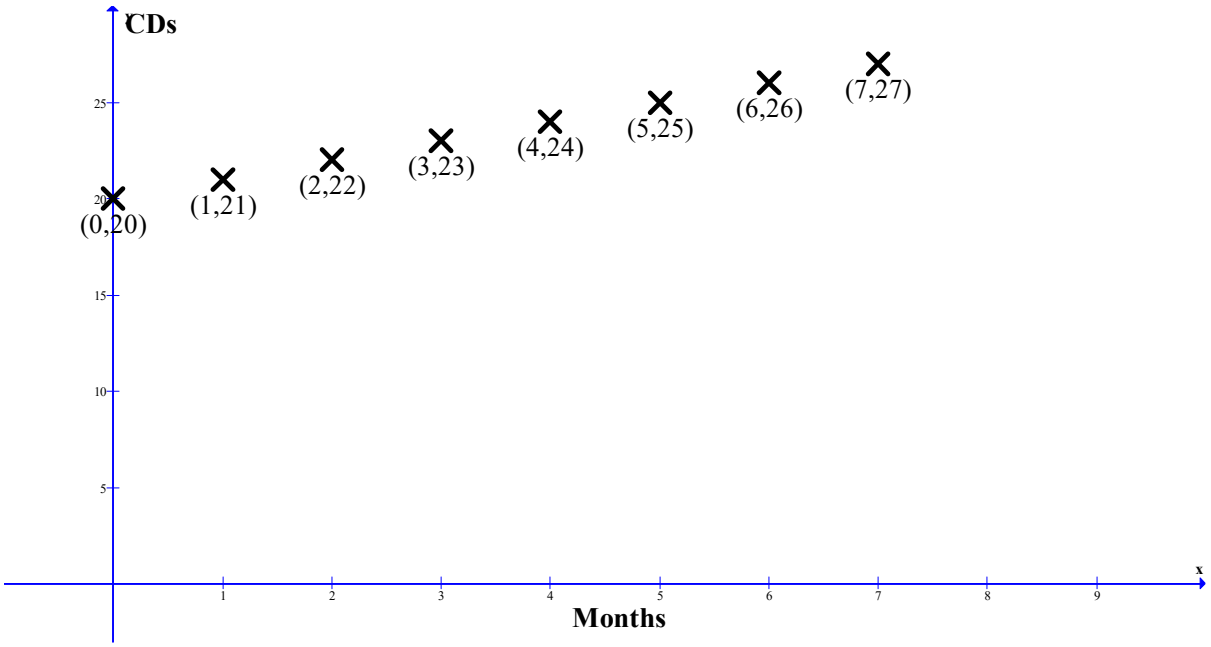
Since he only puts a lolly in every minute, it makes no sense to graph values for fractions of minutes

10) Alan has 20 CDs in his collection. At the end of each month he buys a CD

a) Draw a table that shows how many CDs in his collection each month

Months	1	2	3	4	5	6	7
CDs	21	22	23	24	25	26	27

b) Graph the relationship



c) Explain why the points should not be joined

He buys a CD each month, so it makes no sense to graph points for parts of a month

Year 7 Mathematics

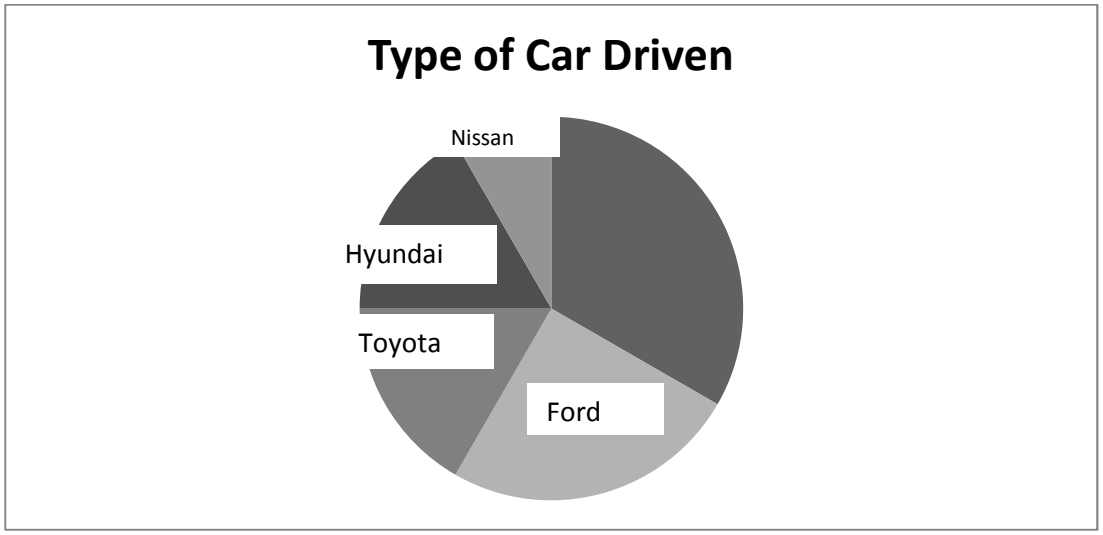
Data

Exercise 1

Representing Data

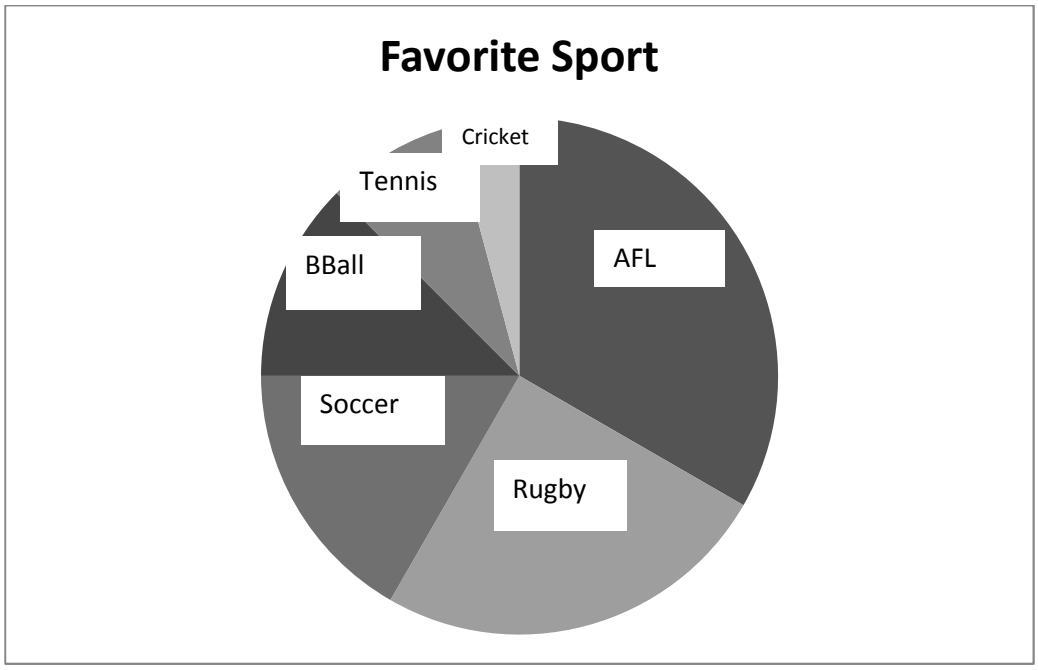
1) Draw a sector (pie) graph that shows the following information

Type of car driven	Number of people
Holden	120
Ford	90
Toyota	60
Hyundai	60
Nissan	30

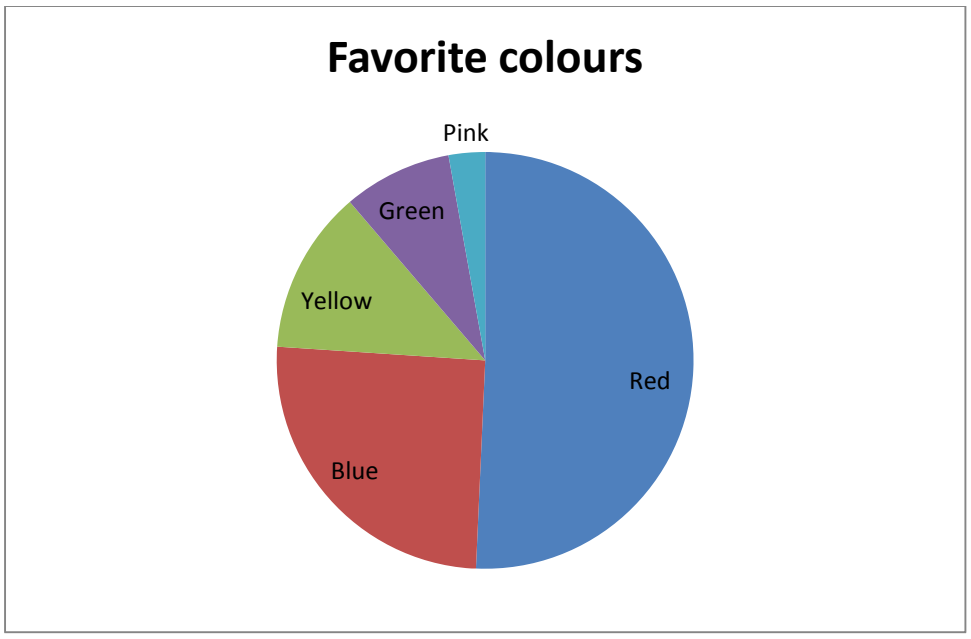


2) Draw a sector (pie) graph that shows the following information

Favourite sport	Number of people
AFL	16
Rugby	12
Soccer	8
Basketball	6
Tennis	4
Cricket	2



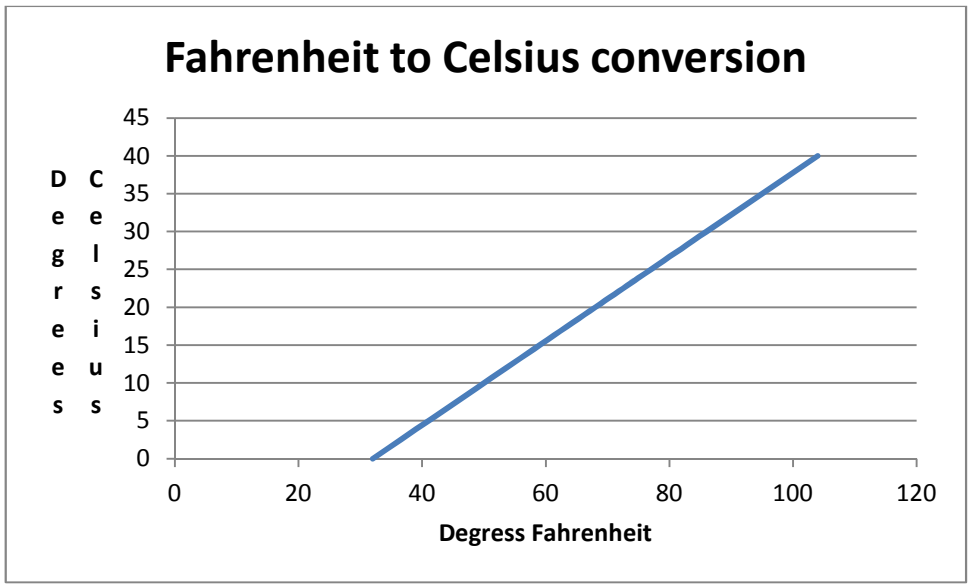
3) By measuring the appropriate angles in the following sector graph, construct a table that describes the information



720 people surveyed

Colour	Degrees	%	Number
Red	180	50	360
Blue	90	25	180
Yellow	45	12.5	90
Green	30	8.3	60
Pink	15	4.2	30
TOTAL	360	100	720

4) The following graph shows the conversion from Fahrenheit to Celsius temperature



a) Approximately how many degrees Celsius is 100 degrees Fahrenheit?

40

b) Approximately how many degrees Fahrenheit is 10 degrees Celsius?

50

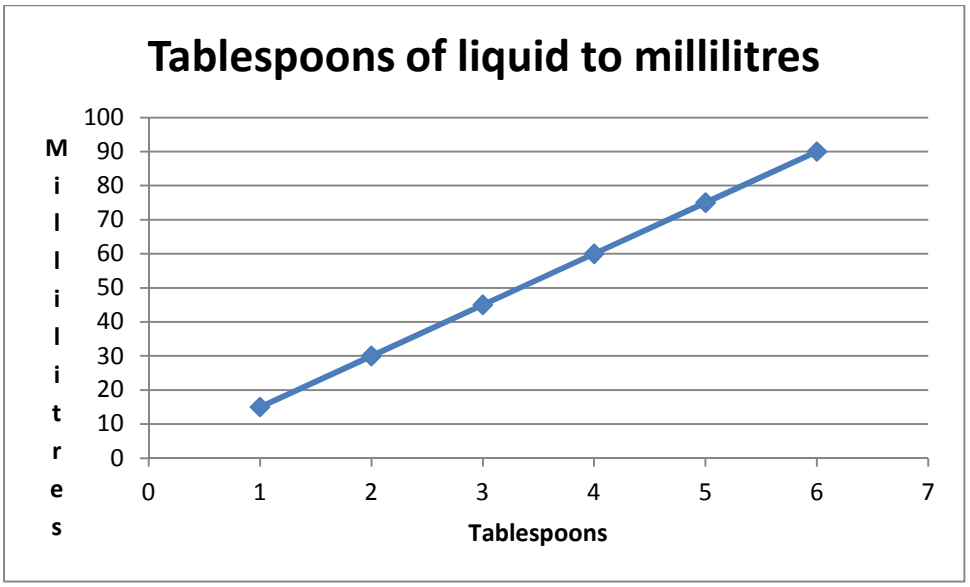
c) The freezing point of water is zero degrees Celsius. At approximately how many degrees Fahrenheit does water freeze?

32

d) Approximately how many degrees does Fahrenheit increase by for every 10 degrees increase in Celsius?

Just under 2 degrees

5) The conversion graph shows the number of millilitres in different numbers of tablespoons of liquid



a) How many millilitres in 4 tablespoons?

60

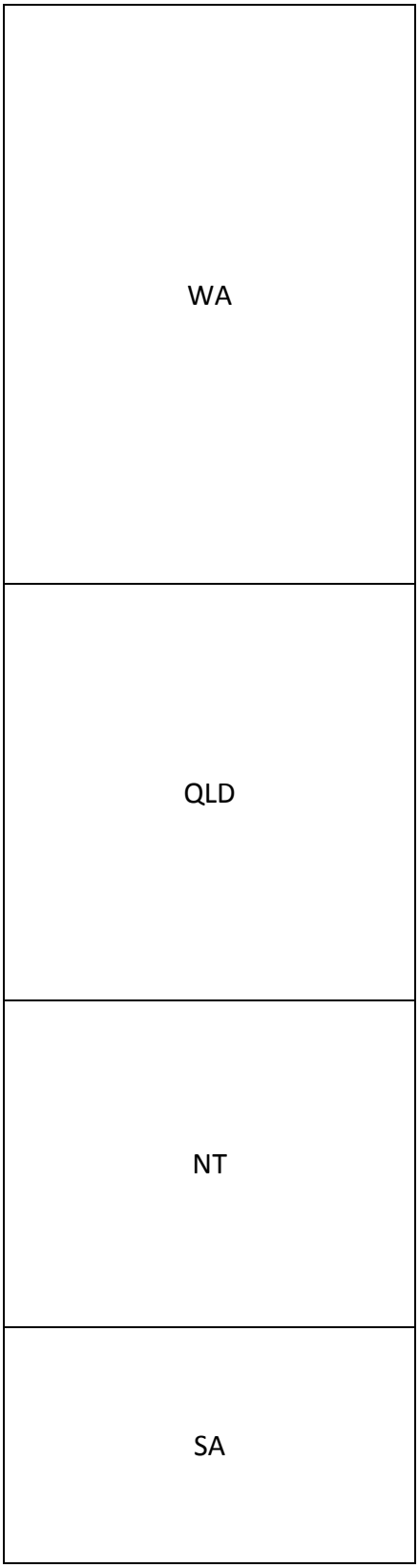
b) How many tablespoons in 90 millilitres?

6

c) How many millilitres of liquid in each tablespoon?

15

6) The following divided bar graph shows the approximate comparison of the area of each state of Australia



NSW
VIC
TAS

a) By measuring the relative sizes, how many times bigger in area is Victoria than Tasmania?

Twice

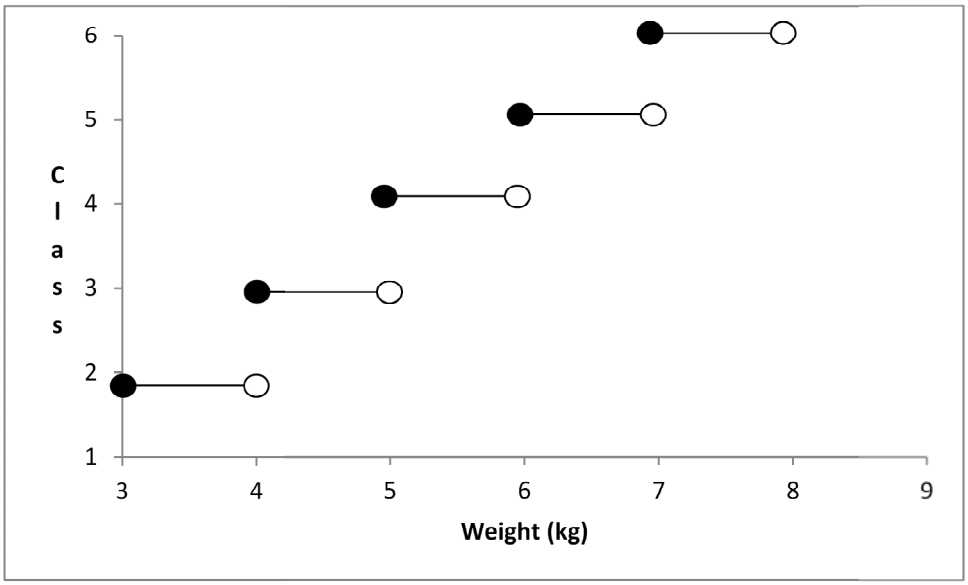
b) Which state has the larger area, NSW or SA?

SA

c) The areas of which two states make up almost exactly 50% of the total area of Australia?

WA and NT

7) Fish are graded into classes according to their weight as shown in the graph below



a) What class is a fish that weighs 4.5 kg?

Class 3

b) Between what weights must a fish be to be a class 5?

6 kg to 7 kg (not including 7 kg exactly)

c) A fish weighs 7kg: what is its class?

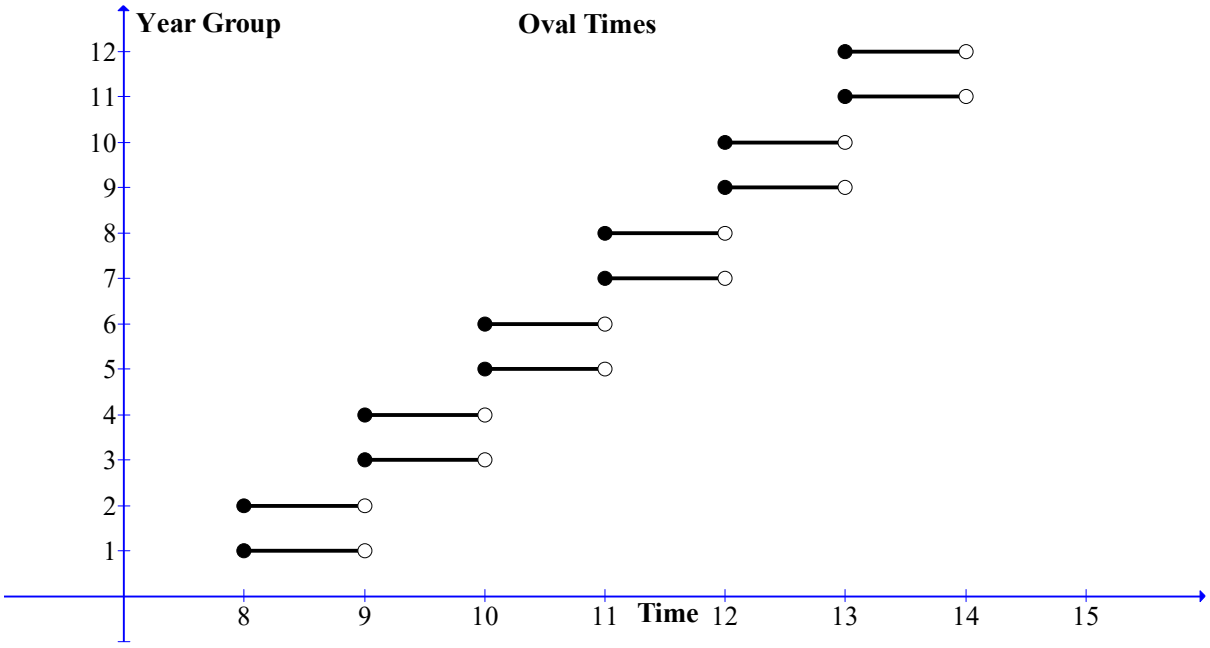
Class 6

8) Draw a graph that represents the following

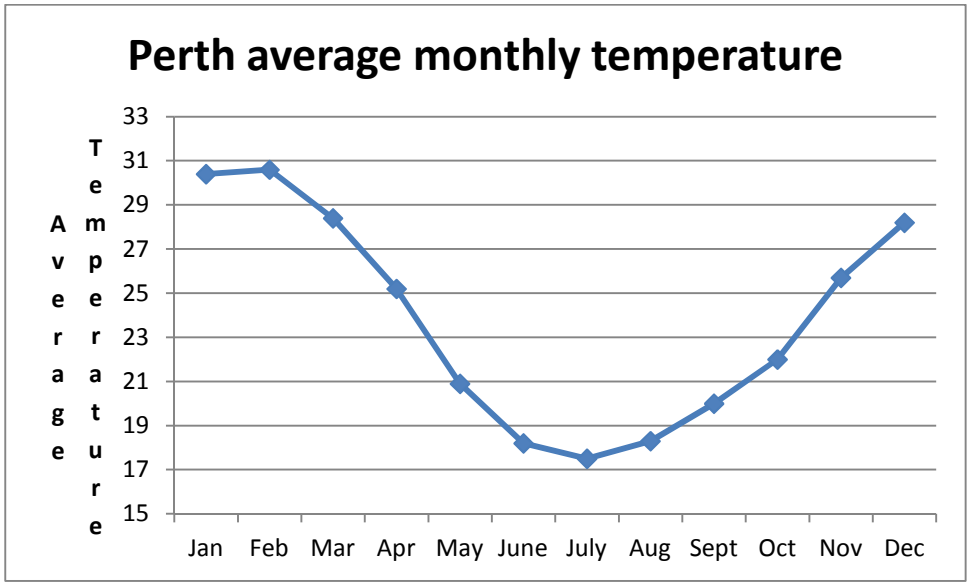
For safety, use of the school oval for athletics is spread over the day

Years 1 and 2 start at 8 o'clock
Years 3 and 4 start at 9 o'clock
Years 5 and 6 start at 10 o'clock
Years 7 and 8 start at 11 o'clock
Years 9 and 10 start at noon
Years 11 and 12 start at 1 o'clock

No other year groups are allowed on the track at these times



9) The graph below shows the average monthly temperature for Perth over the past 50 years



a) For what month is the average temperature highest?

February

b) For what month is the average temperature lowest?

July

c) Between which two months does the average temperature drop by the most?

April and May

d) For what month is the average temperature approximately 25 degrees?

April

e) What is the approximate average temperature for December?

28 degrees

10) Which type of graph of those studied in this exercise would be most suitable to display the following?

- Average monthly petrol prices over the past year

  Line graph

- Results of survey of peoples' favourite food

  Pie graph

- Distribution of religions in a country

  Divided bar graph

- Times for booking a hall

  Step graph

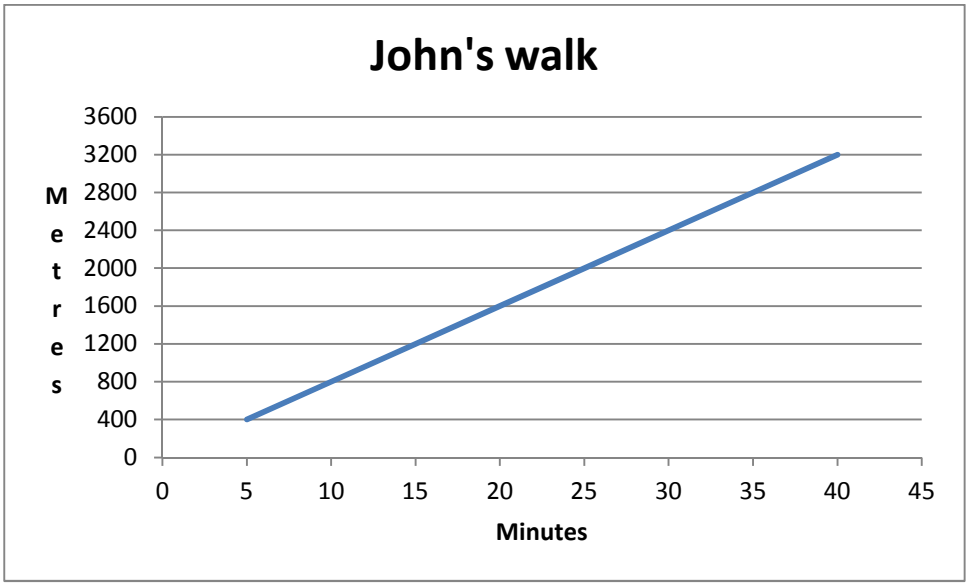
- The relationship between acres and square metres

  Line graph

Exercise 2

Travel Graphs

1) John took a walk. The following graph shows how far he had walked after each 5 minutes



a) How far had John walked after 20 minutes?

1600 metres

b) How long did it take John to walk 1200 metres?

15 minutes

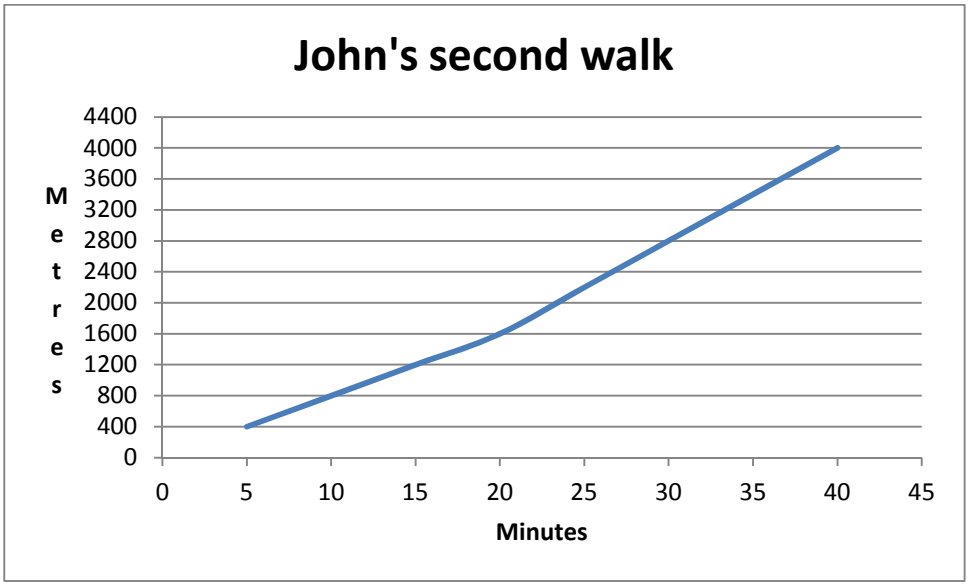
c) How many metres did John walk every 5 minutes

400

d) What was John's speed in metres per minute?

80 metres per minute

2) The next day John took another walk which is graphed below



a) How far had John walked after 10 minutes?

800 metres

b) How long did it take John to walk 3400 metres?

35 minutes

c) After how many minutes did John start walking faster?

20

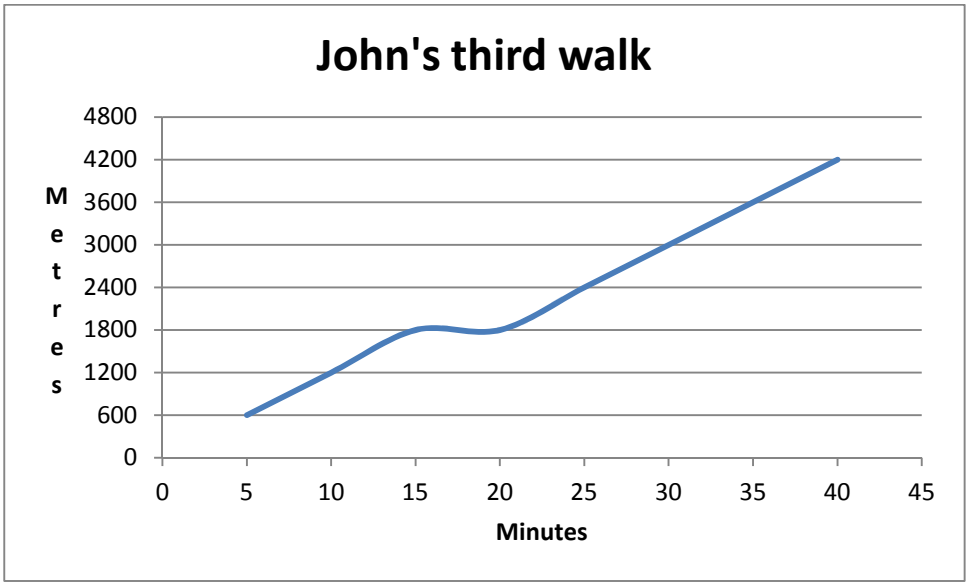
d) After John started walking faster how many metres did he walk every 5 minutes?

600

e) What was John's speed for the faster part of his walk?

120 metres per minute

3) John went for a further walk the next day



a) How far had John walked after 10 minutes?

1200 metres

b) How many minutes did it take John to walk 3600 metres?

35

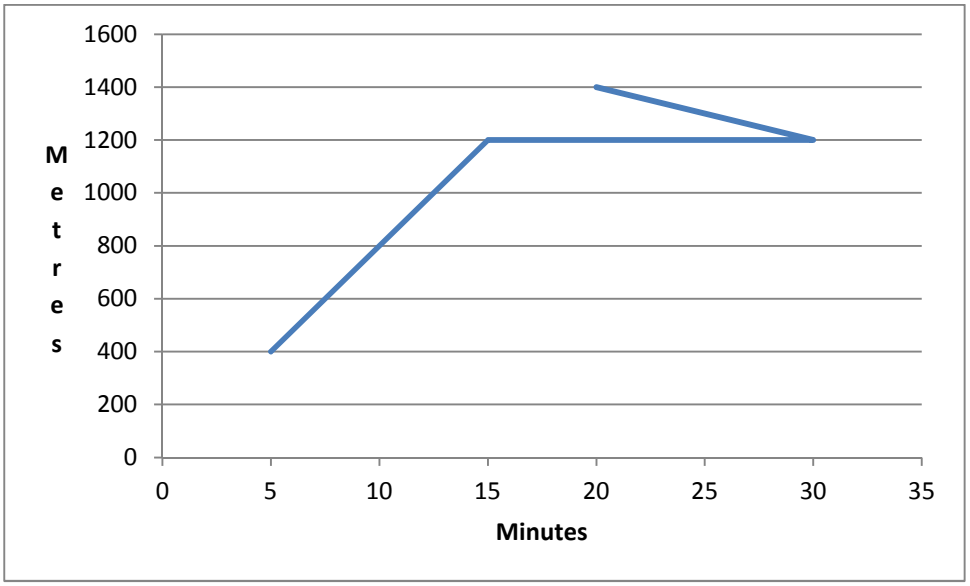
c) After how many minutes of walking did John stop?

15

d) How long did he stop for?

5 minutes

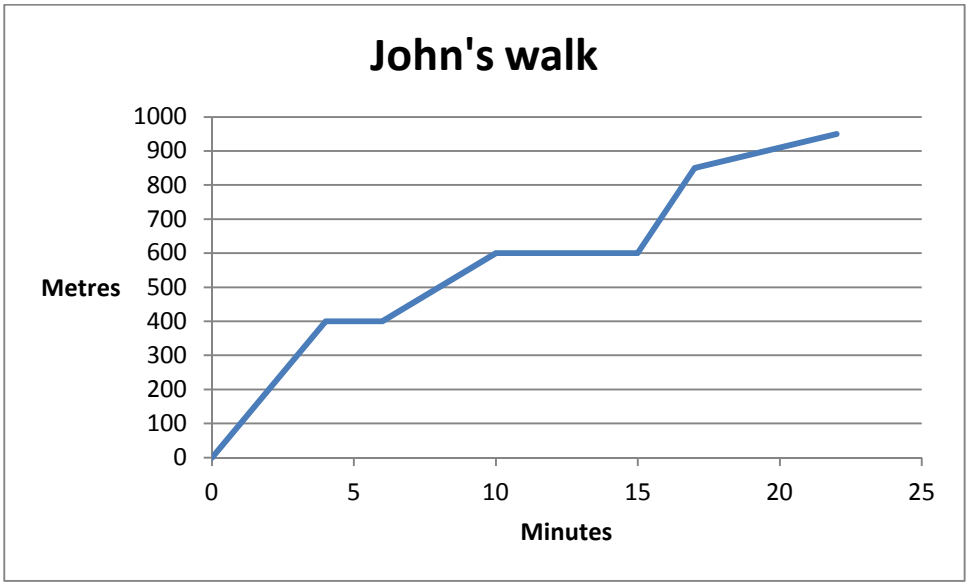
4) Explain why the following walk is not possible



It shows a walker going backwards in time

5) Draw a travel graph that shows the following journey

John walks for 4 minutes and goes 400 metres
He then stops for 2 minutes
He then walks for 4 minutes and goes 200 metres
He stops for a further 5 minutes
He runs for 2 minutes and goes 250 metres
He walks for 5 more minutes and goes 100 metres



6) Match the travel graph to the correct description

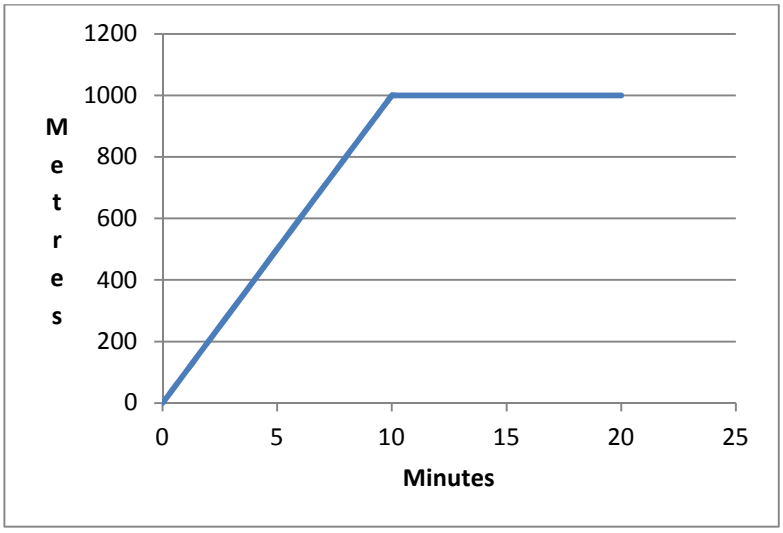
a) John walks at a constant speed of 6 km per hour for 20 minutes (IV)

b) John walks for 10 minutes and goes 1 km then stops for 10 minutes (I)

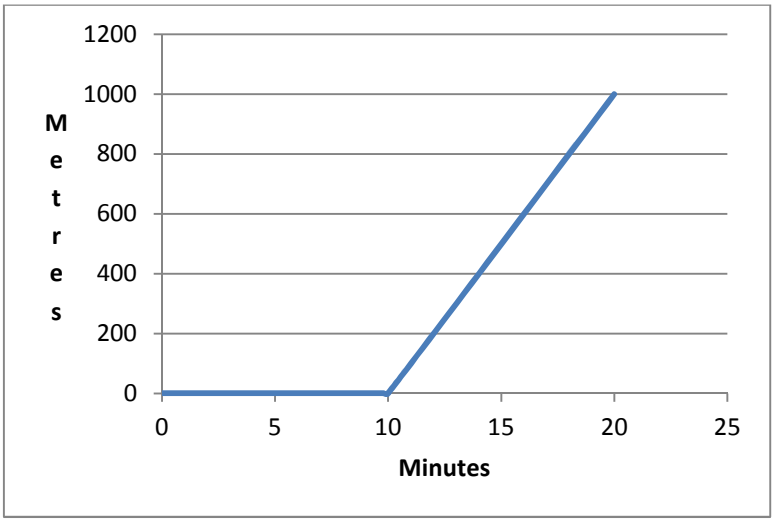
c) John walks for 10 minutes at a speed of 3 km per hour, then walks for 10 minutes at 6 km per hour (III)

d) John stands still for 10 minutes and then walks for 10 minutes and goes 1 km (II)

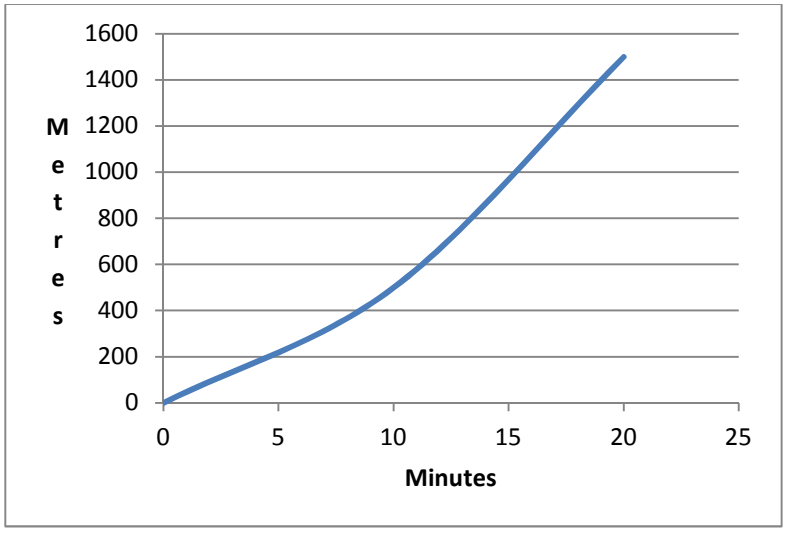
I.



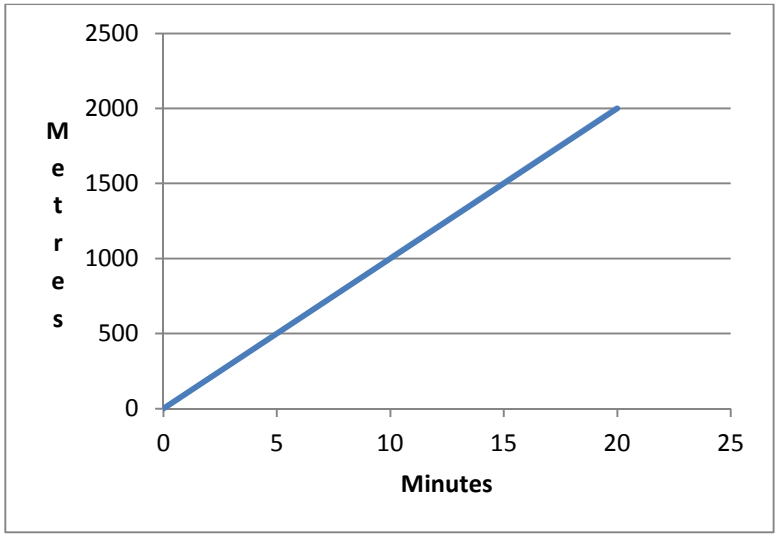
II.



III.



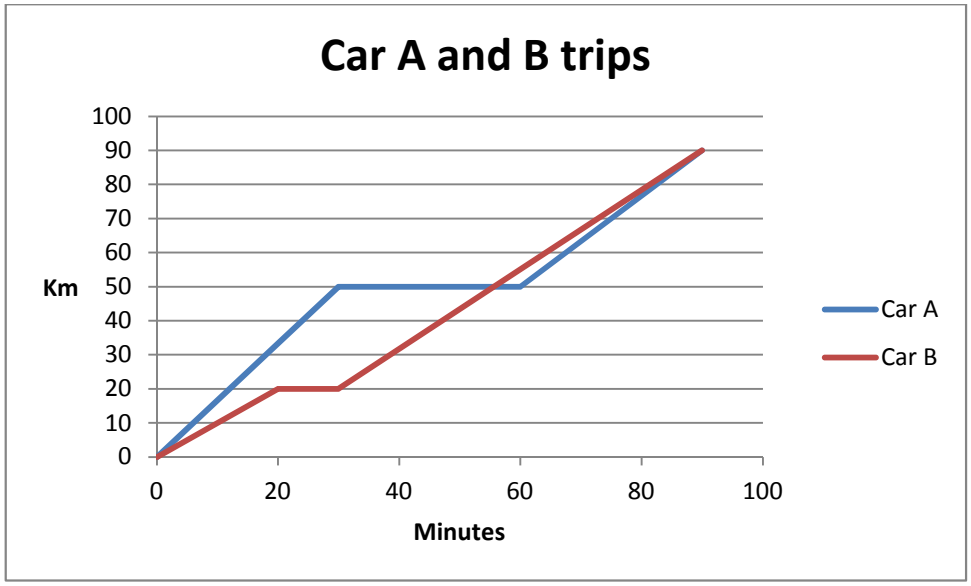
IV.



7) Car A travels for 30 minutes at 100 km per hour, stops for 30 minutes and then travels at 80 km per hour for 30 minutes

Car B travels for 20 minutes at 60 km per hour, and then stops for 10 minutes. It then travels at 70 km per hour for an hour.

Plot each car's journey on the same travel graph, and show which car travels further in the ninety minutes



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Exercise 3

Mean, Mode & Median

1) Find the mean of the following data sets

a) 1, 1, 1, 1,1

Sum = 5

Number of scores = 5

Mean $= \frac{5}{5} = 1$

b) 1, 2, 3, 4, 5

Sum = 15

Number of scores = 5

Mean $= \frac{15}{5} = 3$

c) 2, 4, 6, 8, 10

Sum = 30

Number of scores = 5

Mean $= \frac{30}{5} = 6$

d) 3, 3, 6, 6, 6, 6

Sum = 30

Number of scores = 6

Mean $= \frac{30}{6} = 5$

2) What is the mode of the following data sets?

a) 1, 1, 1, 1, 1

1

b) 3, 3, 6, 6, 6, 6

6

c) 2, 4, 6, 8, 10

No mode

d) 2, 2, 4, 4, 6, 8, 10

2 and 4

e) 1, 1, 2, 2, 3, 3, 4

1, 2, and 3

3) Find the median of the following data sets

a) 1, 1, 1, 1, 1,

1

b) 1, 2, 3, 4, 5

3

c) 2, 4, 6, 8, 10

6

d) 4, 22, 32, 55, 100

32

e) 23, 4, 5, 66, 9

Put numbers in order

4, 5, 9, 23, 66

Median = 9

f) 3, 5, 17, 19, 22, 30

Even number of scores is score between 17 and 19

Median = 18

4)

a) What is the mean of the following?

1, 3, 5, 7, 9

b) What is the mean of the following?

1, 3, 5, 7, 9, 95

c) What effect does adding a large number (an outlier) to a data set have on the value of the mean?

5)

a) What is the mode of the following?

2, 2, 2, 3, 4

2

b) What is the mode of the following?

2, 2, 2, 3, 4, 100

2

c) What effect does adding a large number (an outlier) to a data set have on the value of the mode?

The mode does not change

6)

a) What is the median of the following?

2, 4, 6, 8, 10

6

b) What is the median of the following?

2, 4, 6, 8, 10, 100

Median is number between 6 and 8

Median = 7

c) What effect does adding a large number (an outlier) have on the value of the median?

Increases median slightly

7) Three items on a menu have an average price of $20. If the price of the first item is $10 and the price of the second item is $35, what is the price of the third item?

Sum of the items = $60 (3 x $20)

First two items add to $45

Third item costs $15

8) The following data set has a mean of 6, a median of 6 and a mode of 8. Fill in the missing numbers

(The numbers are in order)

3, _____, _____, 8, _____

Median of 6 gives

3, _____, 6, 8, _____

Mode of 8 gives

3, _____, 6, 8, 8

Mean of 5 scores = 6

Sum of scores = 5 x 6 =30

Sum of known scores = 25

Missing score is 5

Year 7 Mathematics

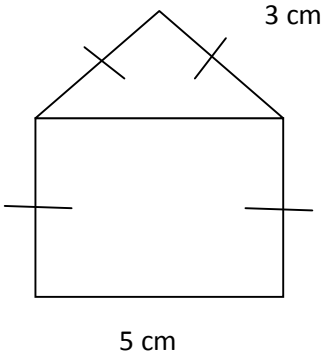
Measurement

Exercise 1

Perimeter & Circumference

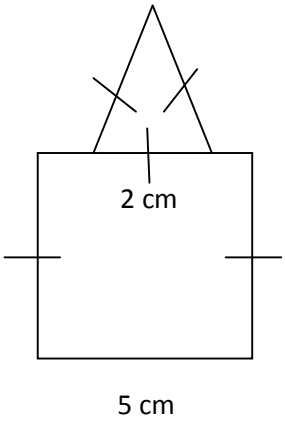
1) Find the perimeter of the following

a)



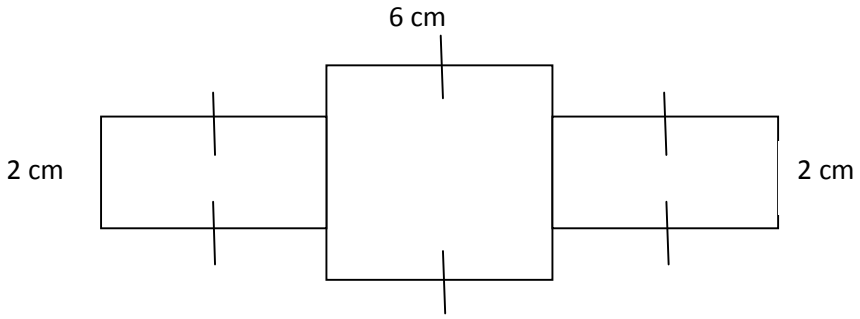
Perimeter $= 5 + 3 + 3 + 3 + 3 = 17cm$

b)



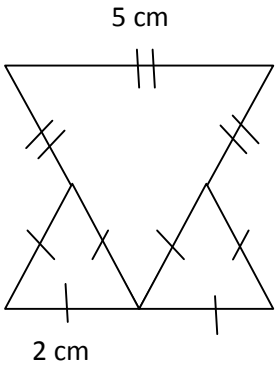
Perimeter $= 5 + 2 + 1.5 + 2 + 2 + 1.5 + 2 = 16cm$

c)



Perimeter $= 6 + 2 + 6 + 2 + 6 + 2 + 6 + 2 + 6 + 2 + 6 + 2 = 48cm$

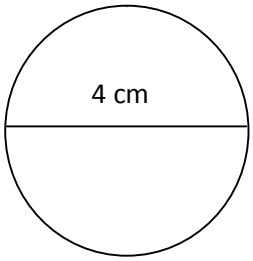
d)



Perimeter $5 + 3 + 2 + 2 + 2 + 2 + 3 = 19cm$

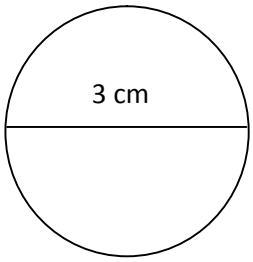
2) Find the circumference of the following correct to 2 decimal places

a)



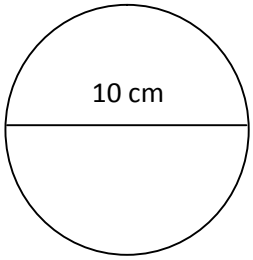
C= $\pi d = 4\pi = 12.56$

b)



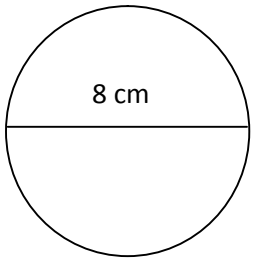
C = $\pi d = 3\pi = 9.42$

c)



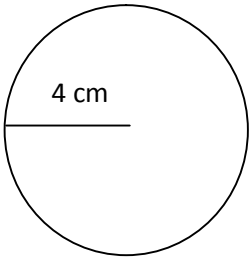
C= $\pi d = 10\pi = 31.42$

d)



C= $\pi d = 8\pi = 25.13$

e)



C= $2\pi r = 2 \times 4 \times \pi = 25.13cm$

3) John walks around a circular running track, whilst Peter walks directly across the middle of it from one side to the other. If Peter walked 300 metres, how far did John walk? (To 2 decimal places)

Diameter = 300 metres

Circumference $= \pi d = 300\pi = 942.48m$

4) The Earth has a circumference of approximately 40,000 km. If you were to drill a hole from the surface to the centre of the Earth, how far would you have to drill? (To 2 decimal places)

Circumference =$2\pi r$

$40{,}000 = 2\pi r$

$$r = \frac{40{,}000}{2\pi} = 6366.2km$$

5) A piece of string is cut so it fits exactly across a circle, going through its centre. If the cut piece of string measures 1 metre, what is the distance around the outside of the circle? (to 2 decimal places)

6) An equilateral triangle sits exactly on the top of a square. If the side length of the square is 20 cm, what is the distance around the whole shape?

7) A rectangle of side lengths 3 cm and 4 cm is cut across its diagonal to form a triangle. What is the perimeter of this triangle?

8) A circular athletics field has a circumference of 400 metres. If a javelin thrower can hurl the javelin a maximum of 80 metres, is it safe to throw javelins in the field without being a danger to runners? Allow 10 metres for a javelin thrower to run up

9) As part of its act, a lion runs directly across the middle of a circus ring, around it 5 times, then back across the middle of the ring to its cage. If the distance across the ring is 3 metres, how far does the lion run in its act?

Exercise 2

Units of Measurement

1) How many metres in

a) 1 mm

0.001 m

b) 1 cm

0.01 m

c) 1 km

1000 m

d) 1000 mm

1 m

e) 100 cm

1 m

f) 0.001 km

1 m

2) Convert the following to cm

a) 10 mm

1 cm

b) 100 mm

10 cm

c) 1000 mm

100 cm

d) 1 m

100 cm

e) 10 m

1000 m

f) 15 m

1500 m

3) Convert the following to m

a) 1000 mm

1 m

b) 1000 cm

10 m

c) 10,000 cm

100 m

d) 10 km

10000

e) 100 km

100000

4) Which unit of measurement (mm, cm, m, Km) would be most appropriate to measure the length of the following?

a) Soccer pitch

m

b) Pencil

cm

c) Person

m or cm

d) Tower

m

e) Staple

mm

f) TV screen

cm

g) River

km

h) Bead

mm

5) Estimate the length of the following, using the appropriate unit of measurement

a) Giraffe

4 to 6 m

b) Lap top

75 cm

c) Cricket bat

1 m

d) Shoe

50 cm

e) TV remote control

20 cm

f) Butter knife

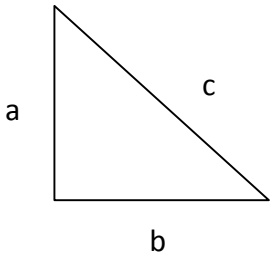
10 cm

Exercise 3

Pythagoras' Theorem

1) Identify which side of the following triangles is the hypotenuse

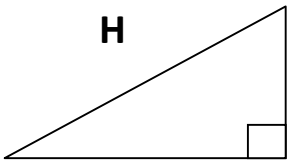
a)



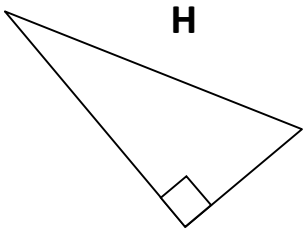
c > b and c > a

c

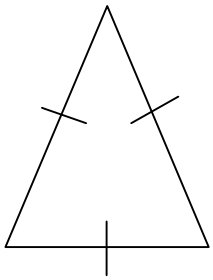
b)



c)



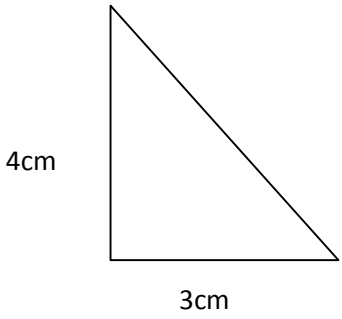
d)



This triangle does not have a hypotenuse; it is not a right-angled triangle

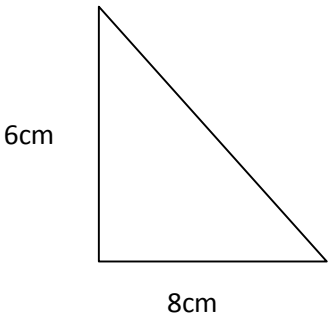
2) Calculate the length of the hypotenuse in the following triangles

a)



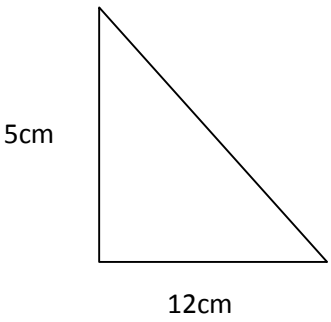
$$x = \sqrt{4^2 + 3^2} = \sqrt{25} = 5\ cm$$

b)



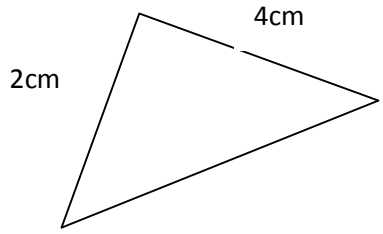
$$x = \sqrt{6^2 + 8^2} = \sqrt{100} = 10cm$$

c)



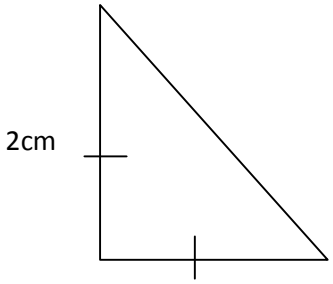
$$x = \sqrt{5^2 + 12^2} = \sqrt{169} = 13$$

d)



$$x = \sqrt{2^2 + 4^2} = \sqrt{20} \cong 4.47cm$$

e)



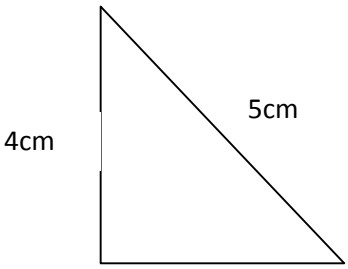
$$x = \sqrt{2^2 + 2^2} = \sqrt{8} \cong 2.83cm$$

3) Explain why an equilateral triangle cannot be right-angled

All three sides of an equilateral triangle are equal, however in a right-angled triangle, the hypotenuse is longer than the other two sides

4) Calculate the missing side length in the following triangles

a)

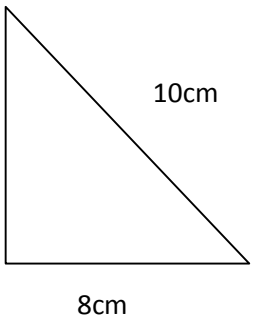


$$5^2 = 4^2 + x^2$$

$$x^2 = 5^2 - 4^2 = 9$$

$$x = 3cm$$

b)

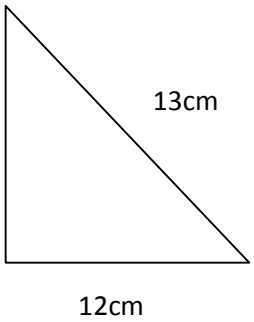


$$10^2 = x^2 + 8^2$$

$$x^2 = 10^2 - 8^2 = 36$$

$$x = 6cm$$

c)

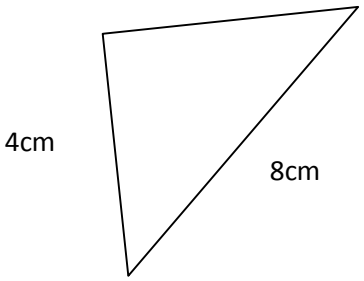


$$13^2 = x^2 + 12^2$$

$$x^2 = 13^2 - 12^2 = 25$$

$$x = 5cm$$

d)

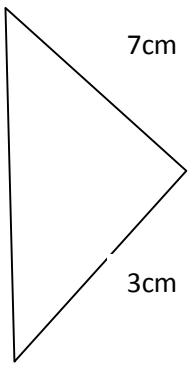


$$8^2 = x^2 + 4^2$$

$$x^2 = 8^2 - 4^2 = 48$$

$$x \cong 6.93cm$$

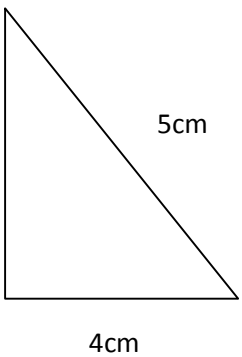
e)



$$x^2 = 7^2 + 3^2$$

$$x = \sqrt{7^2 + 3^2} = \sqrt{58} \cong 7.62cm$$

5) What is the area of the following triangle? (Use Pythagoras' to find required length)



Area of triangle $= \frac{1}{2} \times base \times height$

Need to calculate height

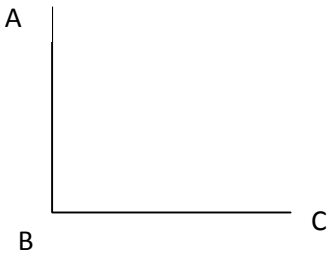
$x^2 + 4^2 = 5^2$

$x^2 = 25 - 16 = 9$

$x = 3$

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

6) To get from point A to point C, a motorist must drive via point B. The distance from A to B is 15km. The distance from B to C is 20km. If the government wishes to build a bridge directly from A to C, how much distance will be taken off the trip?



Let distance from A to C be x km

$x^2 = 15^2 + 20^2$

$x^2 = 225 + 400 = 625$

$x = 25km$

The distance from A to C via B is 35 km

The bridge would take 10 km off the trip

7) A slide is 3 metres long. If it is 2 metres high, how far is the bottom of the slide from the base of the ladder?

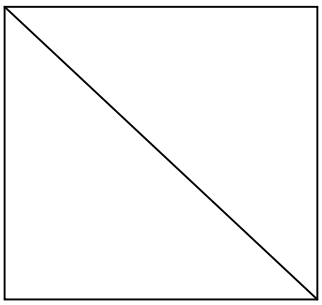
Length of base $= x$

$3^2 = x^2 + 2^2$

$x^2 = 3^2 - 2^2 = 5$

$x \cong 2.23m$

8) A square room is 3 metres long. How far is it from corner to corner?

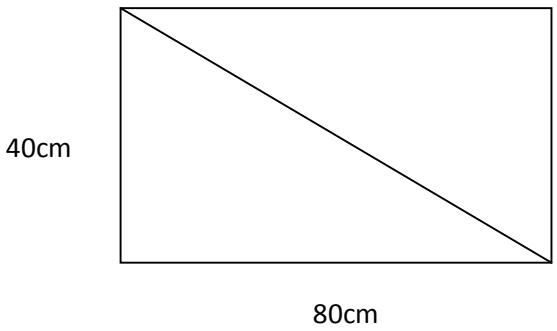


Distance from corner to corner is x

$x^2 = 3^2 + 3^2 = 9 + 9 = 18$

$x \cong 4.24m$

9) A computer screen is 80 cm long by 40 cm wide. What is the distance from corner to corner?



Length of diagonal is x

$x^2 = 40^2 + 80^2 = 8000$

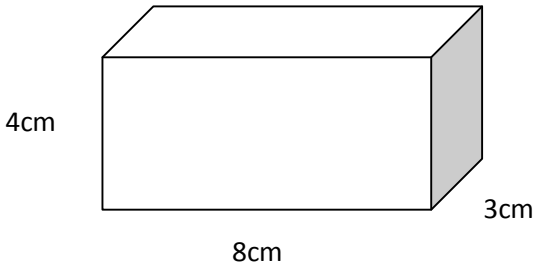
$x \cong 89.44cm$

Exercise 4

Surface Area & Volume of Prisms

1) Calculate the surface area of the following prisms

a)



Surface area is sum of areas of all faces

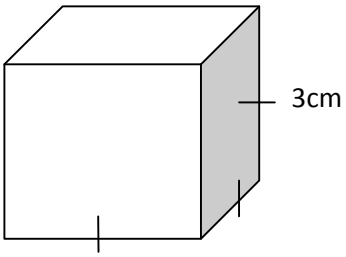
2 faces have area of $8 \times 4 = 32cm^2$

2 faces have area of $8 \times 3 = 24cm^2$

2 faces have area of $3 \times 4 = 12cm^2$

TSA $= (2 \times 32) + (2 \times 24) + (2 \times 12) = 144cm^2$

b)

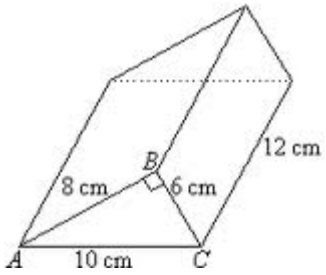


Surface area of cube is sum of area of all faces

Since shape is a cube, all faces have same area

TSA $= 6 \times (3 \times 3) = 54cm^2$

c)



Surface area is sum of areas of all faces

There are 2 triangles of same area and 3 rectangles

Area of triangle $= \frac{1}{2} \times 6 \times 8 = 24cm^2$

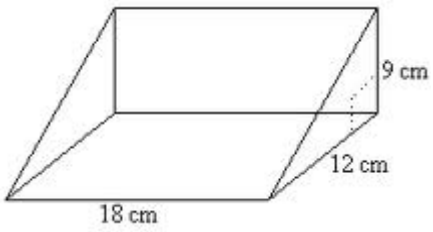
Area of first rectangle $= 12 \times 6 = 72cm^2$

Area of second rectangle $12 \times 8 = 96cm^2$

Area of third rectangle $12 \times 10 = 120cm^2$

TSA $= 24 + 24 + 72 + 96 + 120 = 336cm^2$

d)



Surface area is sum of areas of all faces

There are 2 triangles of same area and 3 rectangles

Area of triangle $= \frac{1}{2} \times 12 \times 9 = 54cm^2$

Area of first rectangle $= 12 \times 18 = 216cm^2$

Area of second rectangle $18 \times 9 = 162cm^2$

For area of third rectangle need length of hypotenuse of triangle

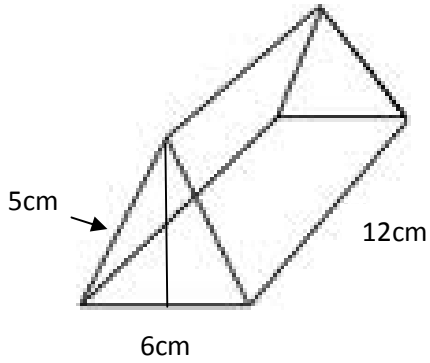
$x^2 = 9^2 + 12^2 = 225$

$x = 15$

Area of third rectangle $15 \times 18 = 240cm^2$

TSA $= 54 + 54 + 216 + 162 + 240 = 726cm^2$

e)



Surface area is sum of areas of all faces

There are 2 triangles of same area and 3 rectangles

Need height of triangle to calculate area

LET HEIGHT BE $x\ cm$

Vertical height line bisects base at 3 cm

Using Pythagoras, $5^2 = 3^2 + x^2$

$x^2 = 5^2 - 3^2 = 16$

$x = 4cm$

Area of triangle $= \frac{1}{2} \times 6 \times 4 = 12cm^2$

Area of first rectangle $= 12 \times 6 = 72cm^2$

Area of second rectangle $12 \times 5 = 60cm^2$

Area of third rectangle $12 \times 5 = 60cm^2$

TSA $= 12 + 12 + 72 + 60 + 60 = 216cm^2$

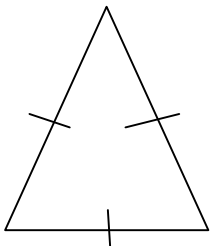
2) The surface area of a cube is 54 cm^2. What is its side length?

The area of each of the cube's 6 faces is the same

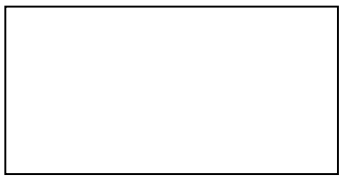
The area of each face is $54 \div 6 = 9cm^2$

Each face is a square of side length 3 cm

3) The following shapes are put together to make a prism. What is its surface area?



4cm



4cm

10cm

Surface area is sum of areas of all faces

There are 2 triangles of same area and 3 rectangles

Height of triangle is x

$x^2 + 2^2 = 4^2$

$x^2 = 16 - 4 = 12$

$x \cong 3.46cm$

Area of triangle $= \frac{1}{2} \times 4 \times 3.46 = 6.92cm^2$

Area of first rectangle $= 10 \times 4 = 40cm^2$

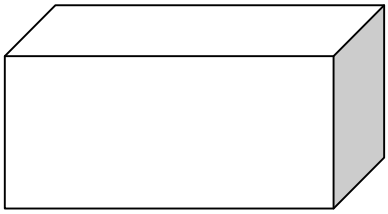
Area of second rectangle $10 \times 4 = 40cm^2$

Area of third rectangle $10 \times 4 = 40cm^2$

TSA $= 6.92 + 6.92 + 40 + 40 + 40 = 133.84cm^2$

4) Calculate the volume of the following prisms

a)



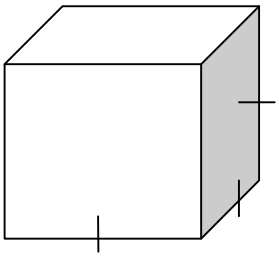
Area of shaded region = 20cm^2

8cm

Volume = Area of base x height

$V = 20 \times 8 = 160cm^3$

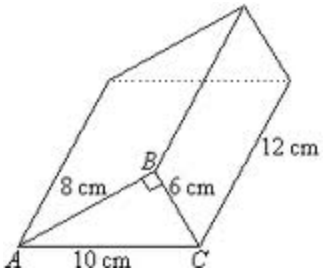
b)



Volume = length x breadth x height

$V = 3 \times 3 \times 3 = 27cm^3$

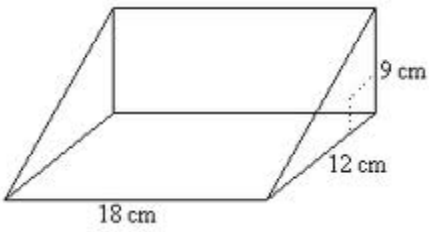
c)



Volume = Area of base x height

$V = \left(\frac{1}{2} \times 8 \times 6\right) \times 12 = 288cm^3$

d)

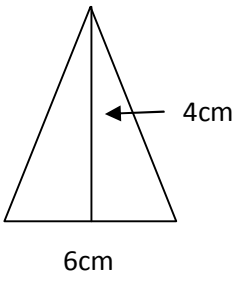


Volume = Area of base x height

$V = \left(\frac{1}{2} \times 12 \times 9\right) \times 18 = 972cm^3$

5) In each part below there is a cross section of a prism that has a length of 12cm. What are their volumes?

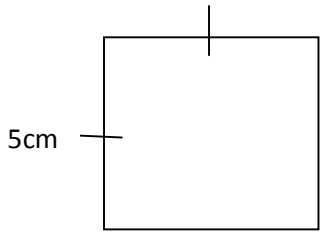
a)



Area of triangle $= \frac{1}{2} \times base \times height = \frac{1}{2} \times 6 \times 4 = 12cm^2$

Volume = Area of base x height $= 12 \times 12 = 144cm^3$

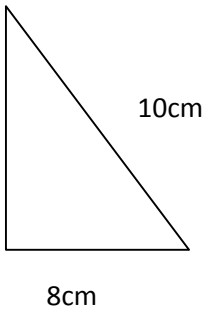
b)



Area of square $5 \times 5 = 25cm^2$

Volume $= 25 \times 12 = 300cm^3$

c)



Area of triangle $= \frac{1}{2} \times 8 \times height$

Let height be x

$x^2 + 8^2 = 10^2$

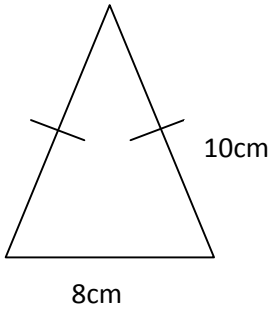
$x^2 = 10^2 - 8^2 = 36$

$x = 6$

Area of triangle $= \frac{1}{2} \times 8 \times 6 = 24cm^2$

Volume $= 24 \times 12 = 288cm^3$

d)



Area of triangle $= \frac{1}{2} \times 8 \times height$

Let x be height

$10^2 = x^2 + 4^2$

$x^2 = 10^2 - 4^2 = 84$

$x \cong 9.17cm$

Area $= \frac{1}{2} \times 8 \times 9.17 \cong 36.68cm^2$

Volume $= 36.68 \times 12 = 440.16cm^3$

6) Convert the following to litres

a) 1000 cm^3

1 litre

b) 2000 cm^3

2 litres

c) 4500 cm^3

4.5 litres

d) 750 cm^3

0.75 litres

e) 4125 cm^3

4.125 litres

7) Convert the following to m^3

a) 1000 litres

1 m^3

b) 3 Kilolitres

3 m^3

c) 8000 litres

8 m^3

d) 0.5 Kilolitres

0.5 m^3

e) 600 litres

0.6 m^3

8) A piece of wood which measures 200 cm x 100 cm x 1 cm thick is placed on the ground. A further 9 identical pieces are placed on top of it. What is the volume of the stack of wood? If the structure was hollowed out, how much liquid would the structure hold?

Area of one block $= 200 \times 100 \times 1 = 20000cm^3$

Volume of all blocks $= 9 \times 20000 = 180000cm^3$

$180000cm^3 = 180\ litres$

Year 7 Mathematics

Space

Exercise 1

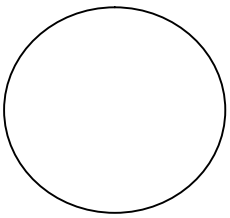
3 Dimensional Shapes

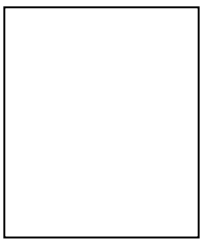
1) .Complete the following table (not all spaces may be able to be filled in)

	Number of faces	**Shape of faces**	**Number and type of congruent faces**	**Vertices**	**Edges**
Triangular Prism	5	Triangles Rectangles	2 triangles	6	9
Rectangular Prism	6	Rectangles	3 pairs of rectangles	8	12
Cylinder	2	Circles	2 circles	NA	NA
Square Pyramid	5	Square Pyramids	No congruent faces	5	8
Triangular Pyramid	4	Triangles	No congruent faces	5	7
Cone	NA	NA	NA	NA	NA
Sphere	NA	NA	NA	NA	NA

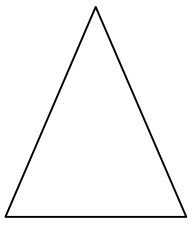
2) Draw two cross sections of each of the following solids. Draw one parallel to the base and the other perpendicular to the base

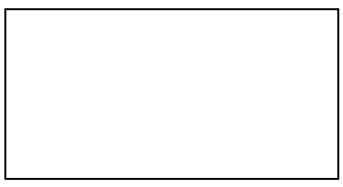
a) Cylinder



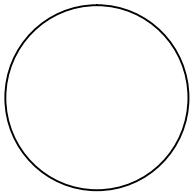


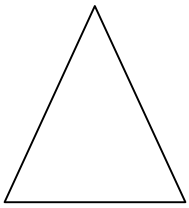
b) Triangular prism



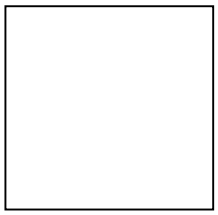


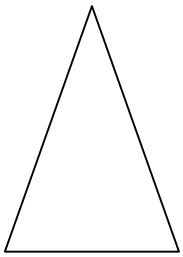
c) Cone



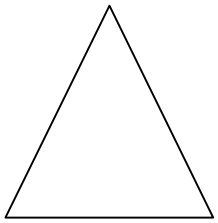


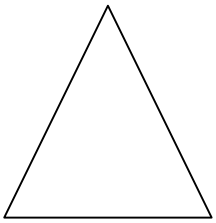
d) Square pyramid



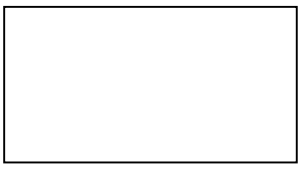


e) Triangular Pyramid



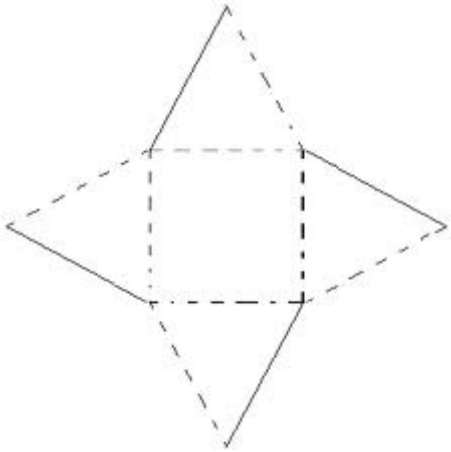


f) Rectangular prism



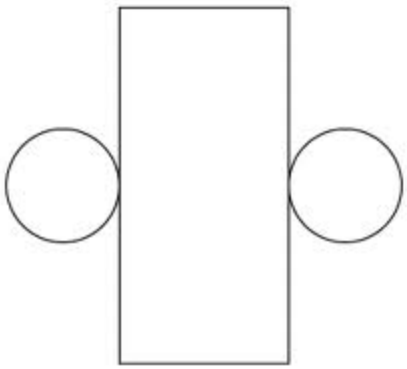
3) Identify the solid from the given net

a)



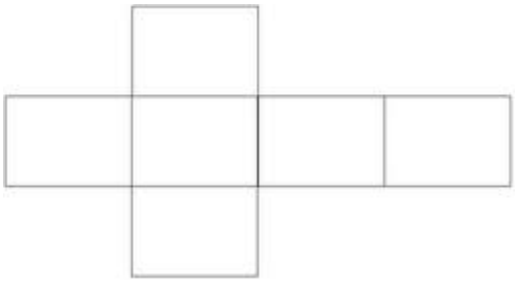
Square pyramid

b)



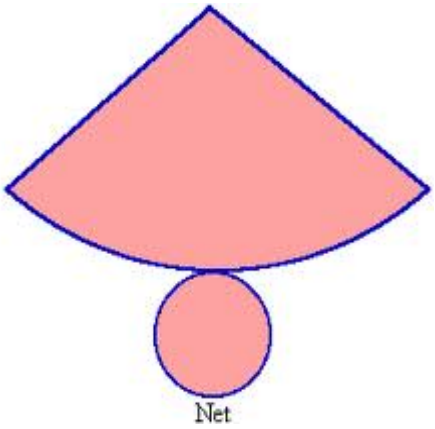
Cylinder

c)



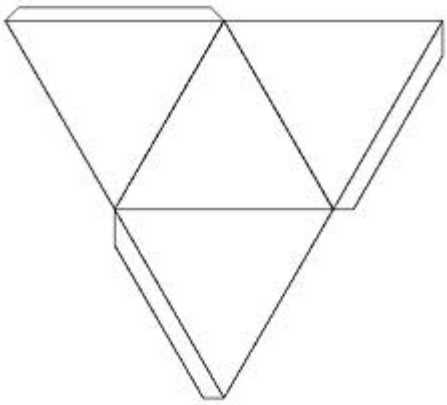
Rectangular prism

d)



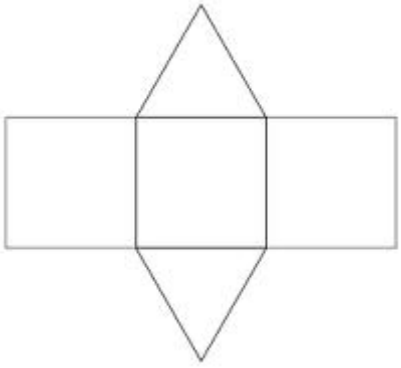
Cone

e)



Triangular pyramid

f)



Triangular prism

4) Which of the following solids are polyhedra?

Triangular prism, cone, triangular pyramid, rectangular prism, square pyramid, cylinder, sphere

All except cone, cylinder and sphere

5) Draw isometric representations of the following shapes built with cubes

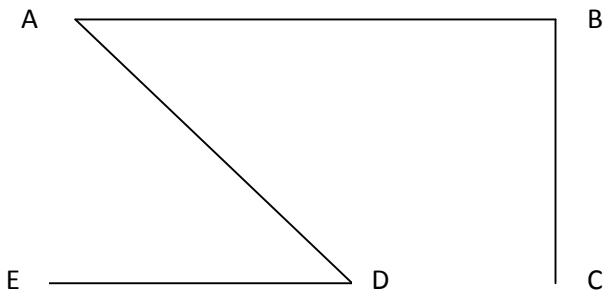
Row 1	Row 2	Row 3
3 cubes x 1 cube	3 cubes x 2 cubes	3 cubes x 3 cubes
3 cubes x 1 cube	3 cubes by 3 cubes	3 cubes by 5 cubes
4 cubes x 2 cubes	5 cubes x 2 cubes	5 cubes x 3 cubes
2 cubes x 2 cubes	4 cubes x 4 cubes	6 cubes x 6 cubes
3 cubes x 3 cubes	3 cubes x 3 cubes	3 cubes x 6 cubes

Exercise 2

Labelling Lines, Angles & Shapes

1) In the diagram identify and name the following

- A point
- A line
- An angle
- A right angle
- A pair of equal angles



Point: A, B, C, D, E

Line: AB, BC, AD, ED

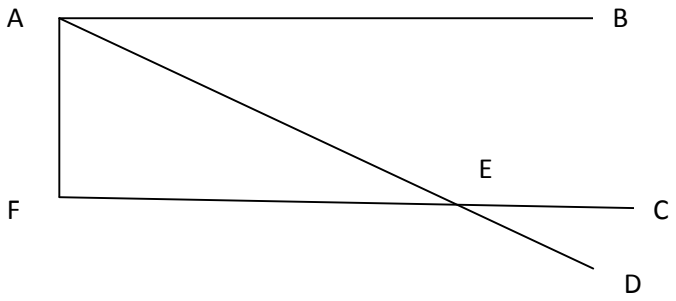
Angle: EDA, DAB, ABC

Right angle: ABC

Equal angles: EDA, DAB

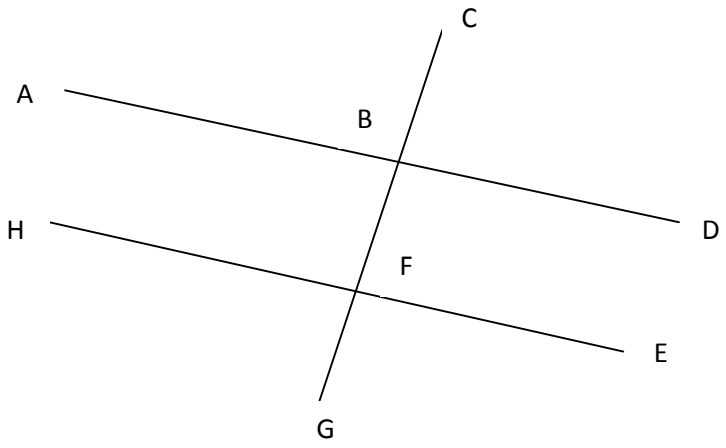
2) In the diagram identify and name the following

- A pair of adjacent angles **BAD and BAF (there are others)**
- A pair of vertically opposite angles **AEC and FED (there are others)**
- A pair of complementary angles **BAF and BAD**
- A pair of supplementary angles **AEC and CED (there are others)**



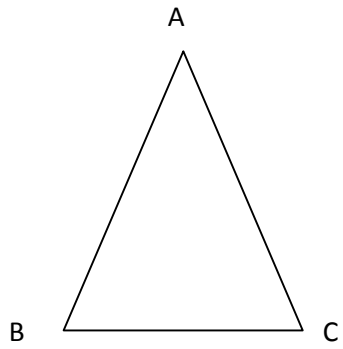
3) In the diagram identify and name the following

- A pair of co-interior angles **DBF and EFB (there are others)**
- A pair of alternate angles **ABF and EFB (there are others)**
- A pair of corresponding angles **ABC and HFB (there are others)**



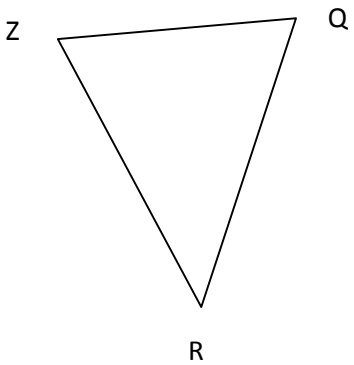
4) Name the following shapes using the correct notation

a)



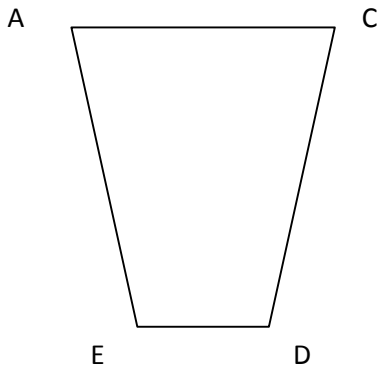
Triangle ABC

b)



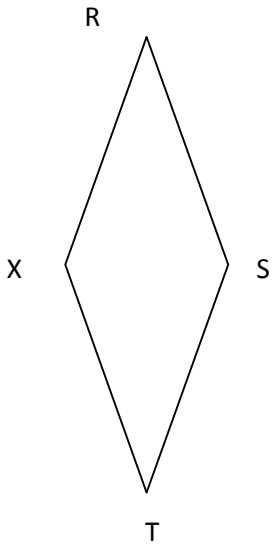
Triangle ZQR

c)



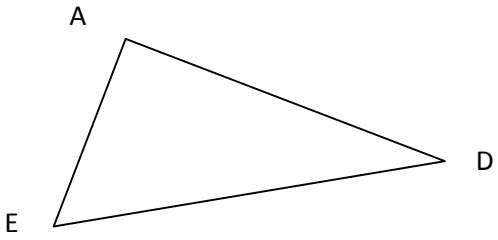
Quadrilateral ACDE

d)



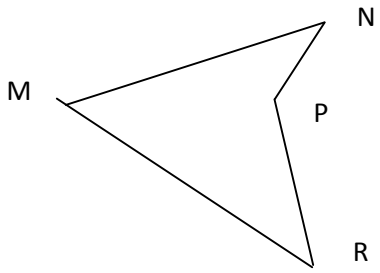
Quadrilateral RSTX

e)



Triangle ADE

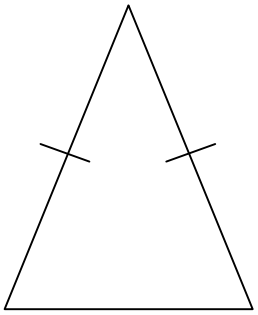
f)



Quadrilateral MNPR

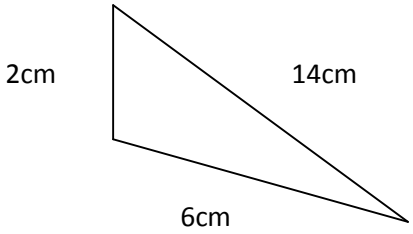
5) Name the following types of triangles, and indicate if the triangle is acute or obtuse angled if appropriate

a)



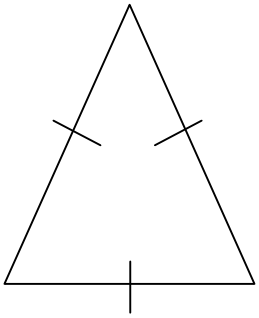
Isosceles: acute angled

b)



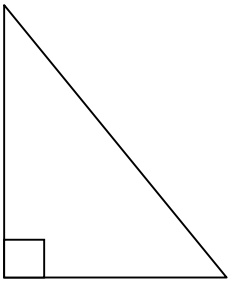
Scalene: obtuse angled

c)



Equilateral: acute angled

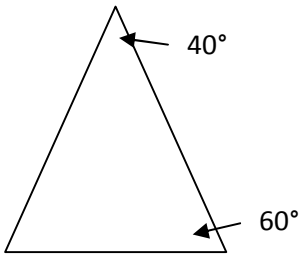
d)



Right angled triangle

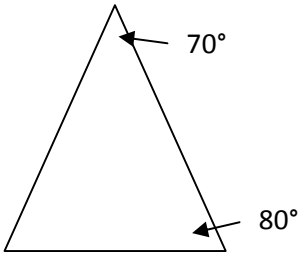
6) Calculate the size of the missing angle(s) in each diagram

a)



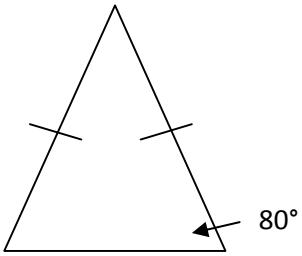
$180 - 40 - 60 = 80°$

b)



$180 - 70 - 80 = 30°$

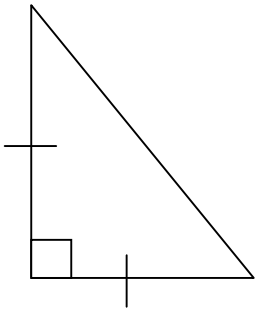
c)



Other base angle = 80°, since the triangle is isosceles

$180 - 80 - 80 = 20°$

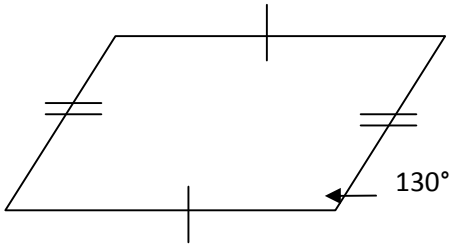
d)



Since triangle is right angled, other two angles must equal 90°

Since the triangle is also isosceles, the angles must each be 45°

e)



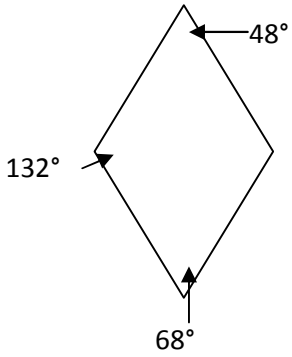
Since opposite angles in a parallelogram are equal, the other obtuse angle measures 130°

The sum of the angles of a quadrilateral is 360°

Therefore the sum of the other two equivalent angles is
$360 - 13 - 130 = 100°$

Each acute angle is 50°

f)



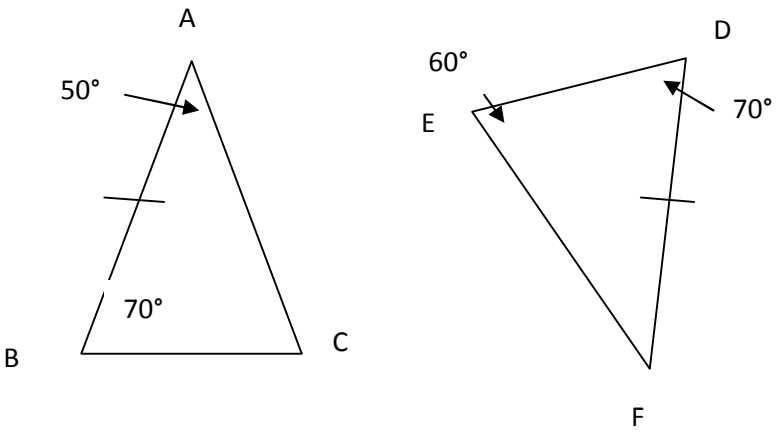
$360 - 132 - 68 - 48 = 112°$

Exercise 3

Congruence & Similarity

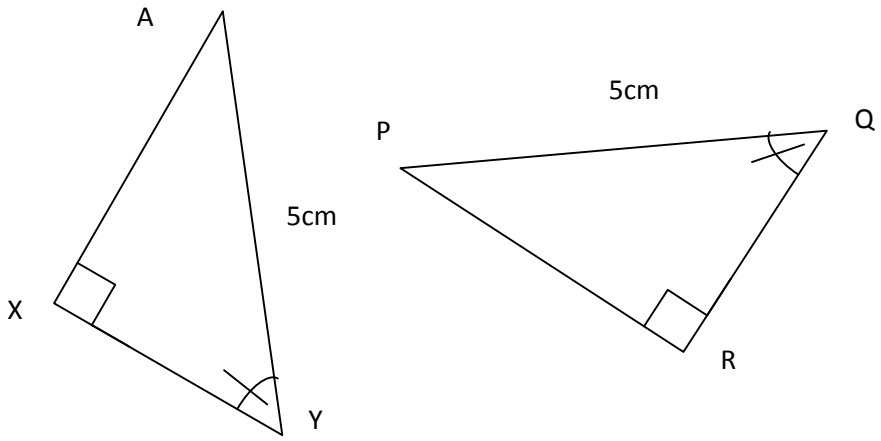
1) Identify which of the following pairs of shapes are congruent, and match the sides and angles when making the congruence statement

a)



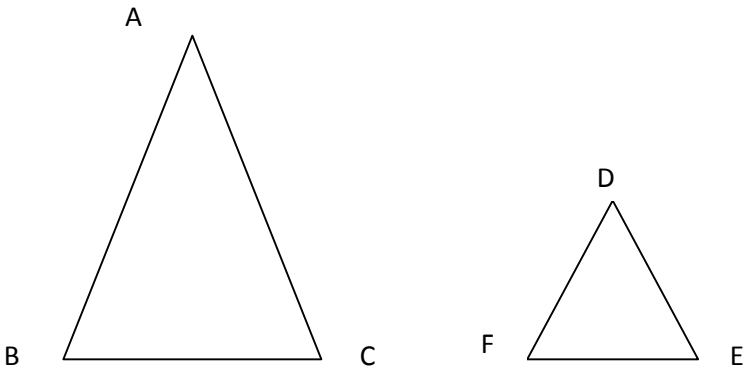
$\Delta ABC \cong \Delta FDE$

b)



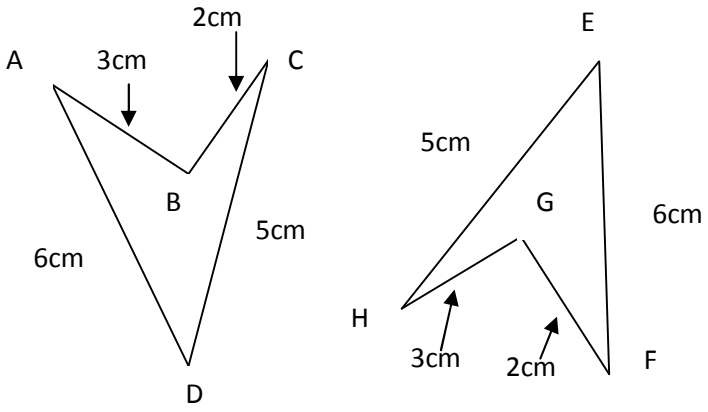
$\Delta AXY \cong \Delta PRQ$

c)



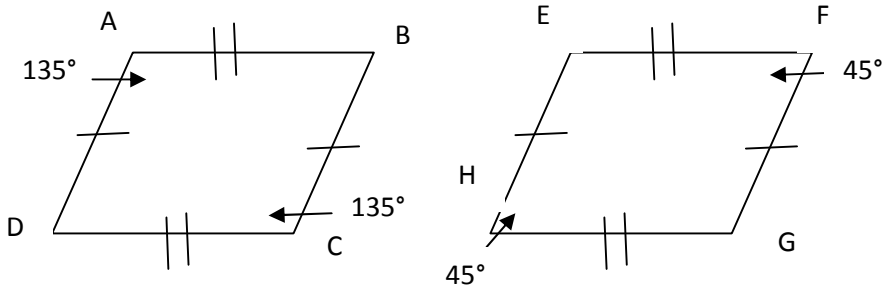
Not congruent

d)



Not congruent

e)



$ABCD \cong EFGH$

2)

a) Two rectangles are similar. The first is 4 cm. wide and 15 cm. long. The second is 9 cm. wide. Find the length of the second rectangle

The scale factor is $\frac{9}{4} = 2.25$

Length $= 2.25 \times 15 = 33.75\ cm$

b) Two rectangles are similar. One is 5 cm by 12 cm. The longer side of the second rectangle is 8 cm greater than twice the shorter side. Find its length and width.

Let the shorter side of the second rectangle $= x$

The longer side $= 2x + 8$

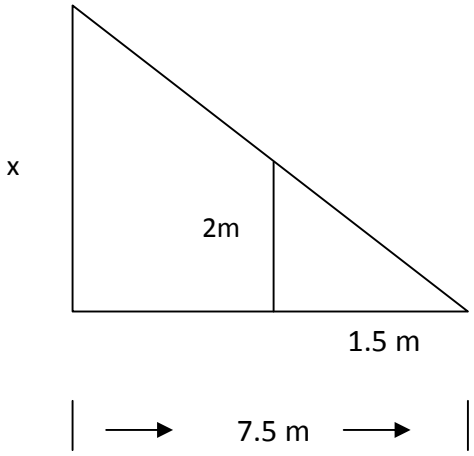
The two sides are in the same ratio as the similar triangle

$$\frac{2x+8}{x} = \frac{12}{5}$$

Either by solving the equation or guess check and improve, $x = 20$

The larger rectangle is 20 cm wide and 48 cm long

c) A tree casts a 7.5 m shadow, whilst a man 2 m tall casts a 1.5 m shadow at the same time. How tall is the tree?

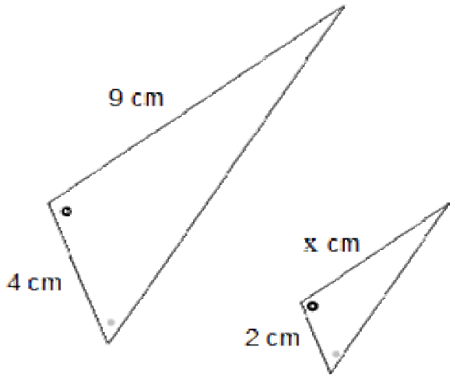


The triangles are similar with a ratio of $\frac{7.5}{1.5} = 5$

Therefore the tree is 5 times as tall as the man, which is 10 metres

3) For each of the following pairs of similar figures, calculate the scale factor, and the value of x

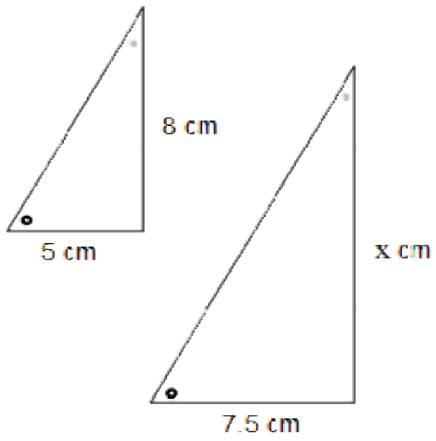
a)



Scale factor is $\frac{4}{2} = 2$

$2x = 9, x = 4.5\ cm$

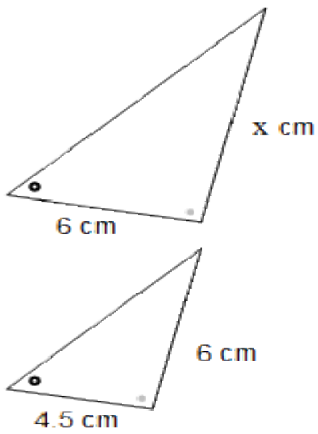
b)



Scale factor is $\frac{7.5}{5} = 1.5$

$x = 1.5 \times 8 = 12cm$

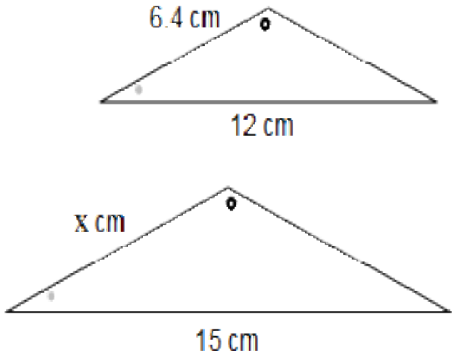
c)



Scale factor is $\frac{6}{4.5} = \frac{4}{3}$

$x = 6 \times \frac{4}{3} = 8cm$

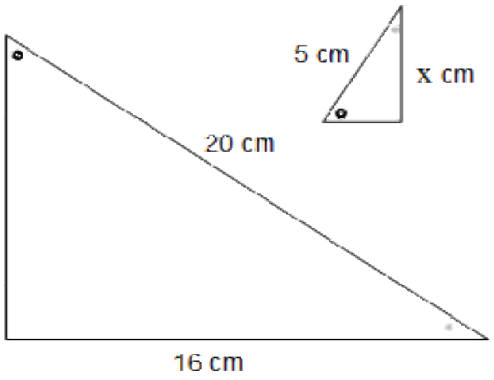
d)



Scale factor $= \frac{15}{12} = \frac{5}{4}$

$x = 6.4 \times \frac{5}{4} = 8cm$

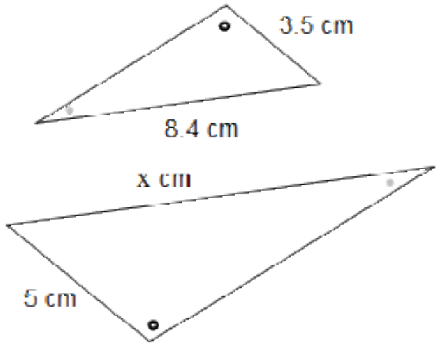
e)



Scale factor $= \frac{20}{5} = 4$

$4x = 16, x = 4cm$

f)

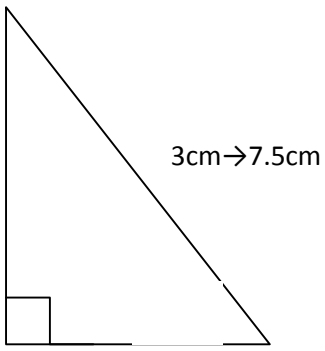


$$\text{Scale factor} = \frac{5}{3.5} = \frac{10}{7}$$

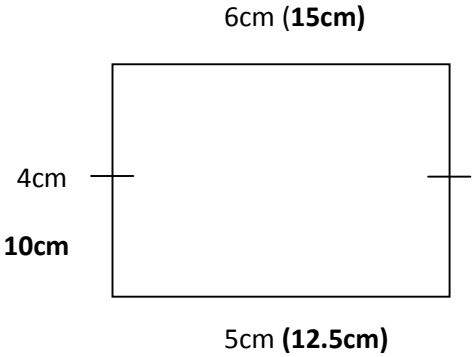
$$x = 8.4 \times \frac{10}{7} = 12cm$$

4) Enlarge the following shapes by a scale factor of 2.5.

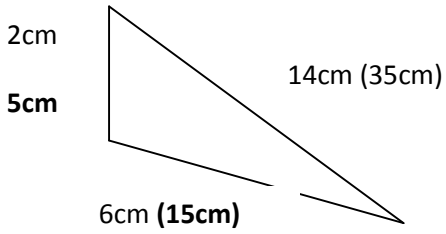
a)



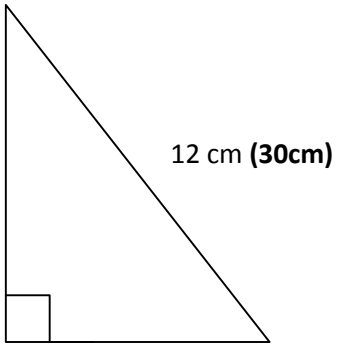
b)



c)



d)



5) The Eiffel Tower is approximately 300 metres tall and sits on a square base of approximately 100 m in length. If a man makes an exact scale model in the ratio 1:25, what are the dimensions of the model?

The model would be $300 \div 25 = 12m$ tall, and would sit on a base of side length $100 \div 25 = 4m$

6) A building is to be constructed from a blueprint. Firstly a prototype model is built, and then the full size building is constructed. The dimensions on the blueprint are 150cm x 200cm x 500cm. The prototype is built using a scale factor of 4, and then the actual building is made by scaling the model by a factor of 10. What are the dimensions of the actual building, and what is the scale factor between it and the blueprint?

The prototype has dimensions 600 cm x 800 cm x 2000 cm = 6 m x 8 m x 20 m

The actual building has dimensions 60 m x 80 m x 200 m

The scale from the blueprint to the building is 40 (4 x 10)

7) A rectangular prism has dimensions of 2cm x 3cm x 5cm. If each dimension is scaled by a factor of 4.5, what are the dimensions of the new prism? By what scale factor does the volume of the original prism increase by?

Volume of original prism $= 2 \times 3 \times 5 = 30cm^3$

New dimensions are 9 cm x 13.5 cm x 22.5 cm

New volume $= 9 \times 13.5 \times 22.5 = 2733.75cm^3$

Note: $30 \times 4.5 \times 4.5 \times 4.5 = 2733.75$