High School
Mathematics Test 2015

Year 7

Whole Numbers

Non Calculator Section

Name_____

Skills and Knowledge Assessed:

- Identify and describe properties of prime, composite, square and triangular numbers (ACMNA122)
- Investigate index notation and represent whole numbers as products of powers of prime numbers (ACMNA149)
- Investigate and use square roots of perfect square numbers (ACMNA150)
- Apply the associative, commutative and distributive laws to aid mental and written computation (ACMNA151)

Answer all questions in the spaces provided on this test paper by:

Writing the answer in the box or lines provided.

or

Shading in the bubble for the correct answer from the four choices provided.

Show any working out on the test paper. Calculators are **not** allowed.

1. Write the number 105 207 in words.

……..

2. Write the numeral for the number which is two hundred more than one thousand, nine hundred and twenty.

3. What is the single numeral for the number written in expanded notation below?

$4 \times 10\,000 + 3 \times 1\,000 + 7 \times 100 + 9 \times 1$

4. What is the expanded notation for the number 120 304?

- ☐ $1 \times 10\,000 + 2 \times 1\,000 + 3 \times 100 + 4 \times 1$
- ☐ $1 \times 100\,000 + 2 \times 10\,000 + 3 \times 100 + 4 \times 1$
- ☐ $1 \times 100\,000 + 2 \times 10\,000 + 3 \times 100 + 4 \times 10$
- ☐ $1 \times 1\,000\,000 + 2 \times 100\,000 + 3 \times 100 + 4 \times 10$

5. Circle the prime numbers in the list below.

7, 15, 16, 21, 31, 43, 51

6. Dakota drove for 325 km on Monday and 467 km on Tuesday.
How far did she drive altogether on the two days?

☐ 142 km ☐ 782 km ☐ 792 km ☐ 802 km

7. Stacey had 185 photos printed out and gave 79 to her mother and put the rest in her scrapbook.
How many did she put in her scrapbook?

8. Jade does 153 bench presses each day for 7 days.
How many bench presses did she do altogether?

9. Reuben has an allowance of 2 208 text messages that he can send over an 8 day period.
He wants to send the same number each day.
How many should he send each day?

10. What number has a prime factorisation of $2 \times 5 \times 7$?

11. The crowd at a cricket match is 105 948. What is this to the nearest hundred?

12. $15 + 6 \times 4 = ?$

13. Write down all the factors of 80.

……..

14. Which is the prime factorisation of 300?

- ☐ $2 \times 2 \times 3 \times 5$
- ☐ $2 \times 2 \times 3 \times 5 \times 5$
- ☐ $4 \times 3 \times 5 \times 5$
- ☐ $2 \times 2 \times 6 \times 5$

15. Write the prime factorisation of 84.

$84 = \square \times \square \times \square \times \square$

16. Which number is a perfect square and a multiple of 3?

☐ 16 ☐ 25 ☐ 27 ☐ 36

17. List all of the prime numbers between 25 and 40.

……..

18. What is the value of 3^4 ?

19. Write the following calculation in index notation:

$4 \times 4 \times 4 \times 4 \times 4 \times 4 = \square^{\square}$

20. The first three perfect cubes numbers are 1, 8, and 27.
What is the fifth perfect cube?

☐

21. Between which two whole numbers does the square root of 90 ($\sqrt{90}$) lie?

☐ and ☐

22. Which of the numbers below is divisible by 3?

☐ 157 ☐ 347 ☐ 533 ☐ 654

23. Which of the following can be used to determine if a number is divisible by 5?

☐ The first digit of the number is 5.
☐ The last digit of the number is 5.
☐ The last digit of the number is 5 or 0.
☐ The sum of the digits is divisible by 5.

24. Evaluate $15 - (11 - 4) - 6$.

☐

25. Given that $15^2 = 225$ and $21^2 = 441$.
Which is not true?

☐ $(15 \times 21)^2 = 225 + 441$ ☐ $\left(\frac{21}{15}\right)^2 = \frac{441}{225}$

☐ $\sqrt{225} = 15$ ☐ $\sqrt{441} = 21$

26. Given that $8^2 \times 7^2 = 3\,136$. What is the value of $\sqrt{3\,136}$?

☐ 15 ☐ 28 ☐ 56 ☐ 225

27. Write one of the symbols $>$, $<$ or $=$ in the box to correctly complete the sentence below.

$$16 \times 5 \square 99 - 12$$

28. Which of the following statements is true?

Statement I

$7^2 > \frac{120}{2}$

Statement II

$\sqrt{64} \neq 4 \times 2$

☐ Statement I only is true.
☐ Statement II only is true.
☐ Both statements are true.
☐ Neither statement is true.

29. Which is **not** true?

☐ $16 + 9 = 9 + 16$
☐ $16 \times 9 = 9 \times 16$.
☐ $\sqrt{16+9} = \sqrt{16} + \sqrt{9}$
☐ $\sqrt{16 \times 9} = \sqrt{16} \times \sqrt{9}$.

30. For any three numbers a, b and c, which statement is **not** always true?

☐ $a \times b \times c = c \times b \times a$.
☐ $a + b \times c = a \times b + c$.
☐ $a \times (b + c) = a \times b + a \times c$.
☐ $a + b + c = c + b + a$.

31. $3 \times (20 - 9)^2 + 9 =$

☐ 363 ☐ 372 ☐ 1089 ☐ 2 610

32. Find the value of :

$$\frac{3^3 - 2^2 + 2}{\sqrt{25}}$$

33. Joanne is asked to determine if the following statement is true.

If x, y and z are three unequal numbers which are greater than zero then:

$$x \times (y + z) = (x + y) \times (x + z)$$

She uses the numbers 3, 4 and 5 to test the statement.

Are any of these equations that she obtained, true?

- ☐ $3 \times (4 + 5) = (3 + 4) \times (3 + 5)$
- ☐ $4 \times (3 + 5) = (4 + 3) \times (4 + 5)$
- ☐ $5 \times (3 + 4) = (5 + 3) \times (5 + 4)$
- ☐ None of them are true.

34. Find the highest common factor of 48 and 56.

35. Find the lowest common multiple of 35 and 20.

High School
Mathematics Test 2015

Year 7

Whole Numbers

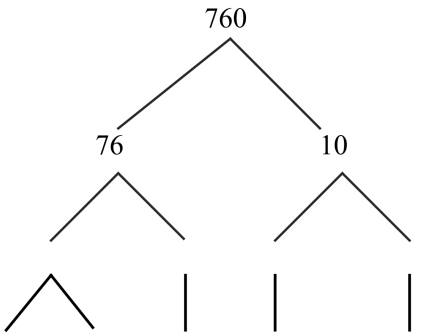
Calculator Allowed
Longer Answer
Section

Name_____

Write all working and answers in the spaces provided on this test paper.
Marks may not be awarded if working out and/or answers are not clear.
Marks allocated are shown beside each question.
Calculators are allowed.

Marks

1. (a) Complete the factor tree below. **2**



(b) Hence write the prime factorisation of 760. **1**

……..

……..

Marks

(c) Another number has a prime factorisation of $2 \times 2 \times 3 \times 5 \times 19$. **2**

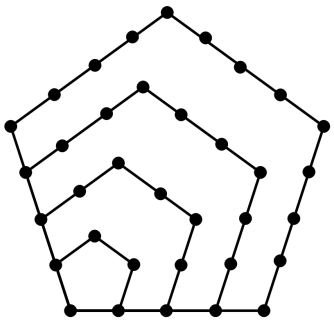
What is the number, and what is the highest common factor of this number and 760?

……..

……..

2. The first five pentagonal numbers are 1, 5, 12, 22 and 35.

The pentagonal numbers can be illustrated by the diagram below.



(a) Add to the diagram above to show the next two pentagonal numbers and write down their values. **3**

……..

……..

Marks

(b) The Square numbers are 1, 4, 9, 16, 25, 36, 49 ….. etc. **2**

The Triangular numbers are 1, 3, 6, 10, 15, 21, 28 ….. etc.

A pattern can be shown using the pentagonal, square and triangular numbers.

1st Pentagonal Number = 1
2nd Pentagonal Number = 4 + 1 = 5
3rd Pentagonal Number = 9 + 3 = 12
4th Pentagonal Number = 16 + 6 = 22
5th Pentagonal Number = 25 + 10 = 35

Complete two more lines of this pattern.

……..

……..

3. The table below gives some squares and cubes.

Number	Square	Cube		Number	Square	Cube
31	961	29791		41	1681	68921
32	1024	32768		42	1764	74088
33	1089	35937		43	1849	79507
34	1156	39304		44	1936	85184
35	1225	42875		45	2025	91125
36	1296	46656		46	2116	97336
37	1369	50653		47	2209	103823
38	1444	54872		48	2304	110592
39	1521	59319		49	2401	117649
40	1600	64000		50	2500	125000

(a) What is the value of : **2**

i) 39^2 ? ……..

ii) 44^3 ? ……..

Marks

(b) What is the value of : **2**

i) $\sqrt{1\ 444}$?

……..

ii) $\sqrt[3]{91\ 125}$?

……..

(c) $29\ 791 \times 64\ 000 = 1\ 906\ 624\ 000.$ **1**

What is the value of $\sqrt[3]{1\ 906\ 624\ 000}$?

……..

……..

High School
Mathematics Test 2015

Year 7 — *Whole Numbers* — Non Calculator Section

ANSWERS

No.	WORKING	ANSWER
1.	One hundred and five thousand, two hundred and seven.	As written at left
2.	$1920 + 200 = 2120$	2120
3.	$4 \times 10\,000 + 3 \times 1\,000 + 7 \times 100 + 0 \times 10 + 9 \times 1 = 43\,709$	43 709
4.	$120\,304 =$ $1 \times 100\,000 + 2 \times 10\,000 + 3 \times 100 + 4 \times 1$	2nd answer
5.	These are not prime $15 = 3 \times 5$ $16 = 4 \times 4$ $21 = 7 \times 3$ $51 = 3 \times 17$ These are prime 7 31 43	(7), 15, 16, 21, (31), (43), 51
6.	$325 + 467 = 792$	3rd answer
7.	$185 - 79 = 106$	106
8.	$153 \times 7 = 1071$	1 071
9.	$8 \overline{)2\,2^{6}\,0^{4}\,8} = 276$	276

10.	$2 \times 5 \times 7 = 10 \times 7 = 70$	70
11.	105 948 = 105 900 (nearest hundred)	105 900
12.	$15 + 6 \times 4 = 15 + 24 = 39$	39
13.	$80 = 1 \times 80 = 2 \times 40 = 4 \times 20 = 5 \times 16 = 8 \times 10$ Factors in order 1, 2, 4, 5, 8, 10, 16, 20, 40, 80	As listed at left
14.	$300 = 30 \times 10 = 6 \times 5 \times 2 \times 5 = 2 \times 3 \times 5 \times 2 \times 5$ $= 2 \times 2 \times 3 \times 5 \times 5$	2nd answer
15.	$84 = 42 \times 2$ $= 21 \times 2 \times 2$ $= 3 \times 7 \times 2 \times 2$ $= 2 \times 2 \times 3 \times 7$	$2 \times 2 \times 3 \times 7$
16.	$36 = 6^2$ and $36 = 3 \times 12$	4th answer
17.	29, 31 and 37	29, 31 and 37
18.	$3^4 = 3 \times 3 \times 3 \times 3 = 9 \times 9 = 81$	81
19.	$4 \times 4 \times 4 \times 4 \times 4 \times 4 = \boxed{4}^{\boxed{6}}$	4^6
20.	4th is 4^3 and 5th is $5^3 = 5 \times 5 \times 5 = 25 \times 5 = 125$	125
21.	$\because 9^2 = 81$ and $10^2 = 100$, so $\sqrt{90}$ lies between 9 amd 10.	9 and 10

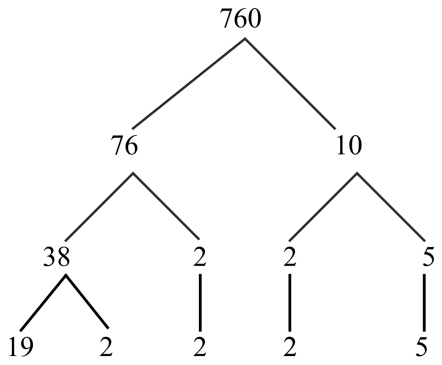
22.	The number is divisible by 3if the sum of the digits is divisible by 3. 1+5+7 = 13 No 3+4+7 = 14 No 5+3+3 = 11 No 6+5+4= 15 Yes	4th answer
23.	The last digit is a 5 or 0, is the complete test.	3rd answer
24.	$15 - (11 - 4) - 6 = 15 - 7 - 6 = 8 - 6 = 2$	2
25.	$(15 \times 21)^2 = 225 \times 441 \neq 225 + 441$	1st answer
26.	$\sqrt{3\,136} = \sqrt{8^2 \times 7^2} = \sqrt{8^2} \times \sqrt{7^2}$ $= 8 \times 7 = 56$	3rd answer
27.	$16 \times 5 \square 99 - 12$ $80 \boxed{<} 87$	<
28.	$7^2 > \frac{120}{2}$ $\sqrt{64} \neq 4 \times 2$ $49 > 60$ $8 \neq 8$ False False Neither statement is true.	4th answer
29.	$16 + 9 = 9 + 16$ Both sides of equality are 25 so true. $16 \times 9 = 9 \times 16$. Both sides of equality are 144 so true. $\sqrt{16 + 9} = \sqrt{16} + \sqrt{9}$ $LHS = \sqrt{25} = 5$ $RHS = 4 + 3 = 7$ so **not true** $\sqrt{16 \times 9} = \sqrt{16} \times \sqrt{9}$. $LHS = \sqrt{144} = 12$ $RHS = 4 \times 3 = 12$ so true	3rd answer

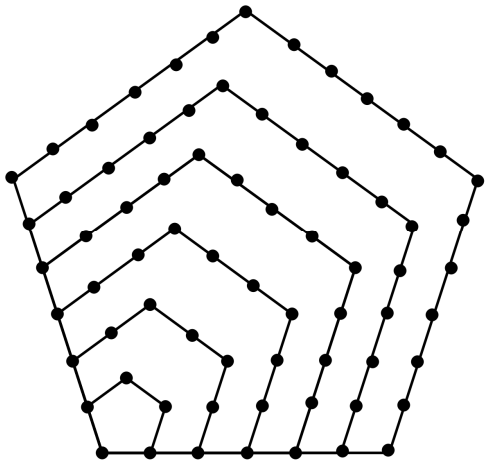
30.	1st is true as multiplication is associative and commutative 2nd is not true , see counter example using 5, 6 and 7 for *a*, *b* and *c*. $a + b \times c = a \times b + c$ *eg* $LHS = 5 + 6 \times 7 = 5 + 42 = 47$ $RHS = 5 \times 6 + 7 = 30 + 7 = 37$ $LHS \neq RHS$ 3rd is true as multiplication is distributive over addition. 4th is true as addition is associative and commutative.	2nd answer
31.	$3 \times (20 - 9)^2 + 9 = 3 \times (11)^2 + 9$ $= 3 \times 121 + 9$ $= 363 + 9$ $= 372$	2nd answer
32.	$\frac{3^3 - 2^2 + 2}{\sqrt{25}} = \frac{27 - 4 + 2}{5}$ $= \frac{23 + 2}{5}$ $= \frac{25}{5}$ $= 5$	5
33.	$3 \times (4 + 5) = (3 + 4) \times (3 + 5)$ $LHS = 3 \times (4 + 5) = 3 \times 9 = 27$ $RHS = (3 + 4) \times (3 + 5) = 7 \times 8 = 56$ Not true $4 \times (3 + 5) = (4 + 3) \times (4 + 5)$ $LHS = 4 \times (3 + 5) = 4 \times 8 = 32$ $RHS = (4 + 3) \times (4 + 5) = 7 \times 9 = 63$ Not true $5 \times (3 + 4) = (5 + 3) \times (5 + 4)$ $LHS = 5 \times (3 + 4) = 5 \times 7 = 35$ $RHS = (5 + 3) \times (5 + 4) = 8 \times 9 = 72$ Not true	4th answer
34.	Factors of 48 : 1, 2, 3, 4, 6, **8**, 12, 16, 24, 48 Factors of 56 : 1, 2, 4, 7, **8**, 14, 28,56	8
35.	Multiples of 35 : 35, 70, 105, **140**, 175, 210 Multiples of 20 : 20, 40, 60, 80, 100, 120, **140**, 160,	140

High School
Mathematics Test 2015

Year 7	*Whole Numbers*	Calculator Allowed Longer Answer Section

ANSWERS

		Marks
1.	(a) 	**2**
	(b) $760 = 2 \times 2 \times 19 \times 2 \times 5$ $= 2 \times 2 \times 2 \times 5 \times 19$	**1**
	(c) $2 \times 2 \times 3 \times 5 \times 19 = 60 \times 19 = 1140$ The number is 1140 $HCF = 2 \times 2 \times 5 \times 19 = 20 \times 19 = 380$	**2**

2.	(a)  The 6^{th} is 51 and the 7^{th} is 70.	**2 for diagram** **1 for numbers**
	(b) The Square numbers are 1, 4, 9, 16, 25, 36, 49 ….. etc. The Triangular numbers are 1, 3, 6, 10, 15, 21, 28 ….. etc. 1st Pentagonal Number = 1 2nd Pentagonal Number = 4 + 1 = 5 3rd Pentagonal Number = 9 + 3 = 12 4th Pentagonal Number = 16 + 6 = 22 5th Pentagonal Number = 25 + 10 = 35 **6th Pentagonal Number = 36 + 15 = 51** **7th Pentagonal Number = 49 + 21 = 70**	**1 for each line**
3.	(a) (i) $39^2 = 1521$ (ii) $44^3 = 85184$	**1 each**
	(b) i) $\sqrt{1\ 444} = 38$ ii) $\sqrt[3]{91\ 125} = 45$	**1 each**
	(c) $29\ 791 \times 64\ 000 = 1\ 906\ 624\ 000.$ $\sqrt[3]{1\ 906\ 624\ 000} = \sqrt[3]{29\ 791 \times 64\ 000}$ $= \sqrt[3]{29\ 791} \times \sqrt[3]{64\ 000}$ $= 31 \times 40$ $= 1\ 240$	**1**