High School Mathematics Test 2013

Year 7

Number Systems

Non Calculator Test

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 provided.
or
Shading in the bubble for the correct answer from the four choices provided.
Show any working out on the test paper.

1. Write the number 103 520 in words.

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2. Write the numeral for the number which is five less than twenty four thousand.

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

$7 \times 10\,000 + 6 \times 1000 + 8 \times 10 + 9 \times 1$

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4. What is the expanded notation for the number 103 490?

- ☐ $1 \times 1\,000 + 3 \times 100 + 4 \times 10 + 9 \times 1$
- ☐ $1 \times 10\,000 + 3 \times 1000 + 4 \times 100 + 9 \times 10$
- ☐ $1 \times 100\,000 + 3 \times 10\,000 + 4 \times 100 + 9 \times 10$
- ☐ $1 \times 100\,000 + 3 \times 1000 + 4 \times 100 + 9 \times 10$

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5. Circle the composite numbers in the list below.

12, 56, 47, 69, 17, 48, 1

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6. Keith has nine hundred and twenty cattle and two thousand three hundred sheep.
How many more sheep than cattle does he have?

☐ 690 ☐ 1380 ☐ 2208 ☐ 6900

7. Bella receives 127 569 online votes in a talent contest.
What is this number rounded to the nearest ten thousand?

☐

8. Which of the numbers below is divisible by 6?

☐ 845 ☐ 866 ☐ 888 ☐ 891

9. Which of the following can be used to determine if a number is divisible by 9?

☐ The last digit of the number is a 3, 6 or 9.

☐ The sum of the digits of the number is divisible by 3.

☐ The last digit of the number is an odd number.

☐ The sum of the digits of the number is divisible by 9.

10. Which of the following is not a multiple of 8?

☐ 64 ☐ 78 ☐ 80 ☐ 96

11. Write down all the factors of 72.

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

12. Which is the prime factorisation of 80?

☐ $1 \times 2 \times 2 \times 2 \times 10$ ☐ $2 \times 2 \times 2 \times 2 \times 5$

☐ $4 \times 2 \times 2 \times 5$ ☐ $2 \times 2 \times 4 \times 5$

13. Write the prime factorisation of 45.

$45 = \square \times \square \times \square$

14. List all of the prime numbers between 10 and 30.

……..

15. What is the value of 5^3 ?

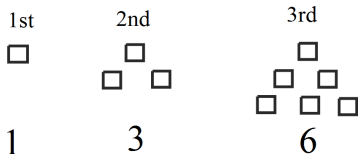
16. Write the following calculation in index notation:

$3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 =$ ☐$^{\square}$

17. Which calculation is the same as $3^2 \times 5^4 \times 7^3$?

- ☐ $3 \times 2 \times 5 \times 4 \times 7 \times 3$
- ☐ $3 \times 3 \times 5 \times 4 \times 7 \times 7 \times 7$
- ☐ $2 \times 2 \times 2 \times 4 \times 4 \times 4 \times 4 \times 4 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$
- ☐ $3 \times 3 \times 5 \times 5 \times 5 \times 5 \times 7 \times 7 \times 7$

18. The first three triangular numbers are shown.
What is the fifth triangular number?



19. Between which two whole numbers does the square root of 90 lie?

☐ and ☐

20. Given that $\sqrt{196} = 14$ and $\sqrt{289} = 17$.

Which is not true?

- ☐ $14^2 = 196$.
- ☐ $2 \times 14 = 196$
- ☐ $17 \times 17 = 289$.
- ☐ $14^2 \times 17^2 = 196 \times 289$.

21. Given that $3^2 \times 9^2 = 729$. What is the value of $\sqrt{729}$?

☐ 12 ☐ 27 ☐ 72 ☐ 81

22. The number represented by the Roman numerals below is :

MMMCMXLVII

3947 ☐ 3997 ☐ 4547 ☐ 4597 ☐

23. Write 846 using Roman numerals. ☐

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

$$45 + 12 \square 17 \times 3$$

25. Which of the following statements is true?

Statement I	Statement II
$\sqrt{49} < 7$	$5^2 \neq 29 - 4$

☐ Statement I only is true. ☐ Statement II only is true.

☐ Both statements are true. ☐ either statement is true.

26. Which is true?

☐ $6 \times (4 \times 2) = (6 \times 4) \times 2$. ☐ $6 - (4 - 2) = (6 - 4) - 2$.

☐ $6 \div (4 \div 2) = (6 \div 4) \div 2$. ☐ $6 \times (4 + 2) = (6 \times 4) + 2$.

27. For any two numbers x and y, which statement is always true?

☐ $x + y = y + x$.

☐ $x - y = y - x$.

☐ $x \div y = y \div x$.

☐ $x^y = y^x$.

28. $4 \times 7 - 20 \div (5 - 1) =$

2 ☐ 3 ☐ 23 ☐ 25 ☐

29. Find the value of :

$$\frac{3 \times 8}{15 - 11}$$

☐

30. a, b and c are three unequal numbers.
What can be said about the statement below?

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

☐ It is true for all values of a, b and c.

☐ It is true only if a, b and c are even numbers.

☐ It is true only if a, b and c are composite numbers.

☐ It is never true, no matter what values are used for a, b and c.

31. Find the highest common factor of 40 and 48.

32. Find the lowest common multiple of 12 and 15.

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Number Systems

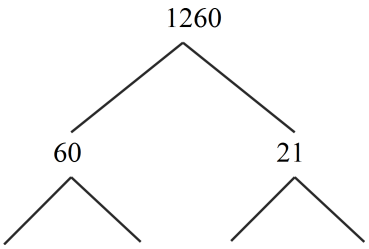
Non Calculator Longer Answer Section

Name_____

Write all working and answers in the spaces provided on this test paper.

Marks

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



(b) Hence write the prime factorisation of 1260 using index notation. **1**

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……..

(c) Another number has a prime factorisation of $2^3 \times 3 \times 5^2$. **2**
What is the number, and what is the highest common factor of this number and 1260?

……..

……..

2. The table below gives some squares and cubes.

Number	Square	Cube
11	121	1331
12	144	1728
13	169	2197
14	196	2744
15	225	3375
16	256	4096
17	289	4913
18	324	5832
19	361	6859
20	400	8000
21	441	9261
22	484	10648
23	529	12167
24	576	13824
25	625	15625

(a) What is the value of 24^3 ? **1**

……..

……..

(b) What is the value of $\sqrt{529}$?

……..

……..

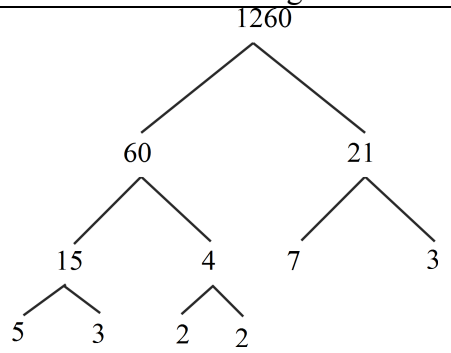
(c) $625 \times 121 = 75\,625$
What is the value of $\sqrt{75\,625}$?

……..

……..

Number Systems
ANSWERS

Non Calculator Section			
1.	One hundred and three thousand, five hundred and twenty.	17.	$3 \times 3 \times 5 \times 5 \times 5 \times 5 \times 7 \times 7 \times 7$
2.	23 995	18.	15
3.	76 089	19.	9 and 10.
4.	$1 \times 100\,000 + 3 \times 1000 + 4 \times 100 + 9 \times 10$	20.	$2 \times 14 = 196$
5.	12, 56, 47, 69, 17, 48, 1	21.	27
6.	1380	22.	3 947
7.	130 000	23.	DCCCXLV1
8.	888	24	$>$
9.	The sum of the digits is divisible by 9.	25.	Neither statement is true.
10.	78	26.	$6 \times (4 \times 2) = (6 \times 4) \times 2$
11.	1, 2, 3, 4, 6, 8, 9, 12, 24, 36, 72	27.	$x + y = y + x$
12.	$2 \times 2 \times 2 \times 2 \times 5$	28.	23
13.	$3 \times 3 \times 5$	29.	6
14.	11, 13, 17, 19, 23, 29	30.	It is true for all values of a, b and c.
15.	125	31.	8
16.	3^8	32.	60

Non Calculator Longer Answer Section		
1.	(a) 	2 marks (1 mark for partially completed or if simple errors made)
	(b) $1260 = 2^2 \times 3^2 \times 5 \times 7$	1 mark

	(c) $2^3 \times 3 \times 5^2 = 8 \times 3 \times 25$ $= 200 \times \times 3$ $= 600$ $HCF = 2^2 \times 3 \times 5$ $= 4 \times 3 \times 5$ $= 20 \times 3$ $= 60$	2 1 for value 1 for HCF
2.	(a) $24^3 = 13\,824$ (from table)	1
	(b) $\sqrt{529} = 23$ (from table)	1
	$\sqrt{75\,625} = \sqrt{625 \times 121}$ $= \sqrt{625} \times \sqrt{121}$ $= 25 \times 11$ (c) $= 275$	1