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Class	Full Name	Index Number
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MID YEAR EXAMINATION

O

MATHEMATICS (4042)
Secondary 1 Express

1 hour 15 mins

14 May 2015

Additional Materials: Nil

INSTRUCTIONS TO CANDIDATES:

1. Write your name, index number and class in the spaces provided at the top of this page.
2. Answer **ALL** the questions on the working space provided.
3. Use of an electronic calculator is allowed.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures.

4. Essential workings must be shown. Loss of essential workings and illegible handwriting will lead to loss of marks.

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50

Setter: Mdm Ng Gek Hwa

This document consists of 7 printed pages (including the cover page).

Answer **all** the questions.

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1 (a) Calculate $\left(\frac{1}{7}\right)^3 + \sqrt{13.56}$, correct to 2 significant figures.

(b) Subtract the sum of $4b - 3c$ and $2c + 3a - 5b$ from $3a - 8b - 7c$.

Answer (a) _____ [1]

(b) _____ [3]

2 Factorise

(a) $2p(1 - a) + 6(1 - a)$

(b) $(3m - 1)(6 - a) - (m + 3)(6 - a)$

Answer (a) _____ [2]

(b) _____ [3]

3 From the expression $2x - 3x^2 - y - 6$, find

- (a) the number of terms,
- (b) the coefficient of y ,
- (c) the product of the constant term and the coefficient of x .

Answer (a) _____ [1]

(b) _____ [1]

(c) _____ [1]

4 Solve

(a) $3(p + 2) - 3(-p - 1) = 12$,

(b) $1 - \frac{4}{13}r = 6$.

(c) $2x - \frac{5x - 6}{4} = 4$

Answer (a) _____ [2]

(b) _____ [2]

(c) _____ [2]

5 The temperatures of a room and a freezer are 23°C and -7°C respectively. On a certain day, the temperature in Alaska is three times the temperature of the freezer. Find

- (a) the difference between the temperatures of the room and the freezer,
- (b) the average of the temperatures of the room and the freezer,
- (c) the temperature in Alaska on that day.

Answer (a) _____ $^{\circ}\text{C}$ [2]

(b) _____ $^{\circ}\text{C}$ [2]

(c) _____ $^{\circ}\text{C}$ [1]

6 Find the value of $\frac{8-2x}{z^3-4y^2}$ when

- (a) $x = 5, y = 2$ and $z = 6$,
- (b) $x = -2, y = 3$ and $z = -1$.

Answer (a) _____ [2]

- (b) _____ [2]
- 7 A piece of wire is 100 cm long. One piece of x cm and two pieces of y cm each are cut from it.
- Express the length of the remaining part in terms of x and y .
 - If the remaining part is bent into a square, express the length of a side of the square in terms of x and y .
 - From (b), if $x = 24$ and $y = 12$, find the area of the square.

Answer (a) _____ [1]

(b) _____ [1]

(c) _____ cm^2 [2]

- 8 In making a lawn in the garden, the cost of fencing is \$20 per metre and the cost of flower-planting is \$50 per metre square. Let x be the length of a side of the lawn in metres.
- If \$ F is the cost of constructing the fence, find a formula connecting F and x .
 - If \$ P is the cost of flower-planting, find a formula connecting P and x .
 - If \$ T is the total cost of making the lawn, find a formula connecting T and x .

Answer (a) _____ [1]

(b) _____ [1]

- (c) _____ [1]
- 9 Nat's mother is 4 times as old as Nat. Nat's sister is 3 years younger than Nat. Let n years old be the age of Nat.

- (a) Express in terms of n , the age of Nat's mother,
- (b) Express in terms of n , the age of Nat's sister,
- (c) If $n = 9$, in how many years' time would the age of Nat's mother be three times his sister? Solve by first forming an equation.

Answer (a) _____ [1]

(b) _____ [1]

(c) _____ [2]

- 10 The length of a side of a metal cube is $(2^2 \times 3^6 \times 5^8)$ cm .

- (a) Find the volume of the cube in index notation.
- (b) Find the positive square root of the result in (a), giving your answer in index notation.
- (c) A piece of wire is cut and soldered to form the framework of the cube. Find the length of the wire used in metres.

Answer (a) _____ cm^2 [2]

(b) _____ [1]

(c) _____ m [2]

11 Simplify

(a) $\frac{t^4}{\sqrt{81}} \div \frac{1}{3}t,$

(b) $\frac{m-1}{2} - \frac{2m-3}{6} - \frac{2(3-m)}{3},$

(c) $4d(d+2) - 2d(8+d).$

Answer (a) _____ [2]

(b) _____ [3]

(c) _____ [2]

		Answers		
1	a	3.7		
	b	$-7b - 6c$		
2	a	$2(p+3)(1-a)$		
	b	$2(m-2)(6-a)$		
3	a	4		
	b	-1		
	c	-12		
4	a	$\frac{1}{2}$		
	b	$\frac{-65}{4}$		
	c	$\frac{10}{3}$		
5	a	30°C		
	b	8°C		
	c	-21°C		
6	a	$-\frac{1}{100}$		
	b	$-\frac{12}{37}$ or -0.324		
7	a	$100 - x - 2y$		
	b	$\frac{100 - x - 2y}{4}$		
	c	169cm^2		
8	a	$F = 80x$		
	b	$P = 50x^2$		
	c	$T = 80x + 50x^2$		
9	a	$4n$		
	b	$n - 3$		
	c	$x + 4(9) = 3(9 - 3 + x)$ $x + 36 = 18 + 3x$ $x = 9$		
10	a	$2^6 \times 3^{18} \times 5^{12}$		
	b	$2^3 \times 3^9 \times 5^6$		
	c	218700		
11	a	$\frac{t^3}{3}$		
	b	$\frac{5m - 12}{6}$		
	c	$2d^2 - 8d$		

The End

1. Arrange the following numbers in ascending order.

$$0.12\dot{5}, \frac{1}{8}, 0.13, 0.1\dot{2}\dot{5}$$

Answer _____, _____, _____, _____ [1]

2. Without the use of calculator, evaluate $6^2 \div [25 - (-4)^2] + (-3)^3$. Show all working clearly.

Answer _____ [2]

3. Consider a gain in temperature to be positive. Write down the following changes in temperature using positive and negative numbers.
 (a) A temperature rise of 50°C .
 (b) A temperature drop of 10°C .

Answer (a) _____ [1]

(b) _____ [1]

4. Without the use of a calculator, evaluate $7 + [4 + (-3)] \div (-2)$.

Answer _____ [2]

5. Calculate $\frac{3.54^2}{\sqrt{3.16 + 2.72 \times 10}}$. Give your answer correct to 3 significant figures.

Answer _____ [2]

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6. Consider the following numbers and expression:

$$1, \sqrt{5}, 2, 2\pi, 9, \sqrt{9}, \sqrt{2^2 \times 5^2 \times 7^2}$$

Write down all

- (a) the perfect squares,
(b) the prime numbers,
(c) the irrational numbers.

Answer (a) _____ [1]

(b) _____ [1]

(c) _____ [1]

7. (a) Round off the following to the nearest whole number.

- (i) $\sqrt{221}$,
(ii) 999.567.

- (b) Hence, estimate the value of $\frac{\sqrt{221}}{999.567}$.

Answer (a) (i) _____ [1]

(ii) _____ [1]

(b) _____ [1]

8. Solve the following equations.

- (a) $11x = 121$
(b) $3y - 11 = 2y + 2$

Answer (a) $x =$ _____ [1]

(b) $y =$ _____ [2]

9. Three bus services are scheduled to leave Ang Mo Kio bus interchange at regular intervals of 9 minutes, 12 minutes and 16 minutes respectively. Given that the three bus services leave the bus interchange together at 5.30 am, determine the time when the three bus services next leave the bus interchange together.

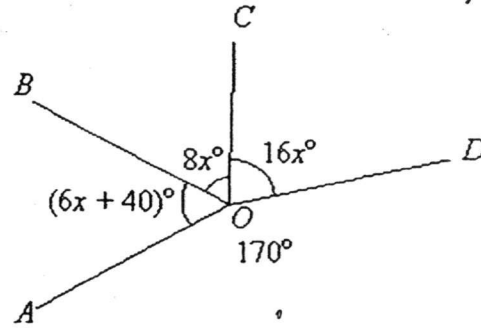
Answer _____ [3]

10. Without the use of calculator, evaluate $5 - \left[-\frac{7}{4} + \left(-\frac{35}{16} \right) \times \frac{2}{7} \right]$, giving your answer in its simplest form. Show all working clearly.

Answer _____ [3]

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11. Given that OA , OB , OC and OD are straight lines, find
- the value of x ,
 - the value of the largest acute angle.

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Answer (a) _____ [2]

(b) _____° [1]

12. (a) Express 198 as a product of prime factors.
 (b) Hence, find the smallest positive integer k , such that $198k$ is a perfect square.

Answer (a) $198 =$ _____ [1](b) $k =$ _____ [1]

- (c) Express 180 as a product of prime factors.
 (d) Hence, find the largest whole number which is a factor of both 180 and 198.

Answer (c) $180 =$ _____ [1]

(d) _____ [1]

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13. Factorise the following completely.

(a) $4h - 6hp - 20hq$,

(b) $-4a(b+4) + 16a(b-2)$.

Answer (a) _____ [1]

(b) _____ [3]

14. Madeline has 45 lollipops, 90 chocolates and 225 sweets to make as many gift packs as possible. Each gift pack has the same number of lollipops, chocolates and sweets.

(a) What is the greatest number of gift packs that can be made?

(b) Hence, how many lollipops and chocolates are there in each gift pack?

Answer (a) _____ [2]

(b) _____ lollipops, _____ chocolates [2]

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15. Ann is 3 times as old as Dave. The sum of their present ages is 52. Let Dave's present age be x .

(a) Express Ann's present age in terms of x .

Answer (a) _____ [1]

(b) Form an equation in terms of x and solve the equation.

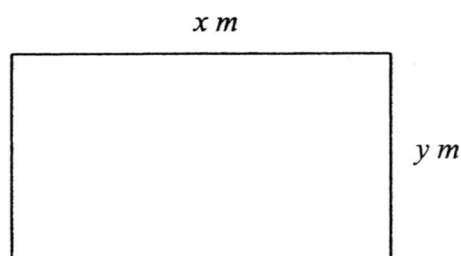
Answer (b) $x =$ _____ [2]

(c) Hence, find Ann's age 3 years ago.

Answer (c) _____ [2]

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16. The diagram shows a rectangular garden with dimension x m by y m, where x and y are positive integers.



When the measurements are corrected to the nearest 10 m, the garden measures 200 m by 110 m. Find

- (a) the smallest possible length (the longer side) of the garden,

Answer (a) _____ m [1]

- (b) the smallest possible perimeter of the garden,

Answer (b) _____ m [2]

- (c) the largest possible length (the longer side) of the garden,

Answer (c) _____ m [1]

- (d) the largest possible area of the garden.

Answer (d) _____ m^2 [2]

End of paper

Answer key

1.	$\frac{1}{8}$, $0.\dot{1}\dot{2}\dot{5}$, $0.12\dot{5}$, 0.13
2.	- 23
3a.	50
3b.	-10
4.	$6\frac{1}{2}$
5.	0.517
6a.	1, 9
6b.	2, $\sqrt{9}$
6c.	$\sqrt{5}$, 2π
7a.	(i) 15 (ii) 1000
7b.	0.015
8a.	11
8b.	13
9.	7.54 am
10.	$7\frac{3}{8}$
11a.	5
11b.	80°
12a.	$2 \times 3^2 \times 11$
12b.	22
12c.	$2^2 \times 3^2 \times 5$
12d.	18

13a.	$2h(2-3p-10q)$
13b.	$12a(b-4)$
14a.	45
14b.	1 lollipop, 2 chocolates
15a.	$3x$ or $52-x$
15b.	13
15c.	36
16a.	195 m
16b.	600 m
16c.	204 m
16d.	23256 m^2