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Answer **all** the questions.

- 1 Calculate $\frac{0.237 \square \sqrt{12.5894}}{0.5132 \square 1.912^3}$, giving your answer correct to 3 decimal places.

Answer [2]

- 2 From the following set of numbers

$$\square \frac{1}{7}, 0, \sqrt{3}, \sqrt[3]{64}, \pi, 36$$

- (a) Write down

- (i) all the integer(s),

Answer [1]

- (ii) all the irrational number(s).

Answer [1]

- (iii) all the perfect square(s).

Answer [1]

- (b) Arrange the given set of numbers in descending order.

Answer [2]

- 3 Round off the following numbers to 3 significant figures.

- (a) 851 529

Answer [1]

- (b) 0.000230127

Answer [1]

- 4 (a) Find the highest common factor of 272 and 96.

Answer [1]

- (b) Find $\sqrt[3]{1728}$ by using prime factorisation.

Answer [2]

- 5 The original price of a computer is \$1 890. It was sold to a shop for \$2 190.

- (a) Calculate the percentage increase in the price of the computer.

Answer% [2]

- (b) In the shop, the marked price of the computer is \$2 888.

A man bought it at a 10% discount during a sale.

Find the amount of profit earned by the shop.

Answer \$..... [2]

- 6 (a) Express $2\frac{3}{4}$ as a percentage.

Answer% [1]

- (b) Express 0.84% as a fraction in its simplest form.

Answer [1]

- (c) Find the fraction which is halfway between $\frac{2}{7}$ and $\frac{3}{7}$.

Answer [1]

- 7 Factorise fully

- (a) $9xy - 3y$,

Answer [1]

- (b) $3a(2 - b) - 12a(b + 3)$.

Answer [3]

8 Simplify

(a) $6x - 3y + 2x + 8z - 2y,$

Answer [1]

(b) $\frac{1}{4}x - \frac{1}{2}y + \frac{1}{6}x - \frac{1}{3}y,$

Answer [2]

(c) $\frac{a \square 1}{2} \square \frac{2a \square 3}{6} \square \frac{2(3 \square a)}{3}.$

Answer [3]

- 9 Cynthia has a box of paper clips.

12.5% of the paper clips are blue.

50% of the remaining paper clips are green.

The rest of the 210 paper clips are red.

How many paper clips are there in the box altogether?

Answerclips [3]

- 10 Solve the following equations.

(a) $4x - 5 = x + 3,$

Answer $x =$ [2]

(b) $\frac{4x}{5} + \frac{2(x-1)}{3} = 3.$

Answer $x =$ [3]

- 11 A shopkeeper bought 60 oranges for $\$ \frac{x}{6}$ each. He then sold them for $\$ \frac{x}{2}$ each.
- (a) Find an expression, in terms of x , for the profit he makes if he sold all oranges. Give your expression in its simplest form.

Answer $\$ \dots\dots\dots$ [2]

- (b) Given that the shopkeeper made a profit of \$60, form an equation in x and solve for x .

Answer $x = \dots\dots\dots$ [1]

- 12 (a) Solve the inequality $-3x \leq -13$.

Answer $\dots\dots\dots$ [1]

- (b) Hence, write down the smallest value of x which satisfies $-3x \leq -13$ if

- (i) x is a prime number,

Answer $x = \dots\dots\dots$ [1]

- (ii) x is a perfect cube,

Answer $x = \dots\dots\dots$ [1]

- (iii) x is a rational number,

Answer $x = \dots\dots\dots$ [1]

13 It is given that $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$.

(a) Find f when $u = 4$ and $v = 5$.

Answer [1]

(b) Find u when $f = 5$ and $v = 7$.

Answer [2]

14 Two different sizes of shampoo are shown below.
The volumes of the shampoo and the prices are shown respectively.
Which size of shampoo gives the better value? You must show all your working clearly.



Answer:
.....
.....
.....
..... [3]

END OF PAPER 1



CHIJ ST. THERESA'S CONVENT
MID-YEAR EXAMINATION 2017
SECONDARY 1 EXPRESS

MATHEMATICS

Paper 2

3 May 2017

1 hour 30 minutes

Additional Material: Answer Paper

READ THESE INSTRUCTIONS FIRST

Write your answer and working on the Answer Paper provided.
Write your index number, and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in the loss of marks.

Calculators should be used where appropriate.

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. Give answers in degrees to one decimal place.

For π , use either your calculator value or 3.142, unless the question requires the answer in terms of π .

At the end of the examination, staple all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total number of marks for this paper is 50.

This document consists of 4 printed pages.

Answer all the questions.

- 1 (a) Written as a product of its prime factors, $180 = 2^2 \times 3^2 \times 5$.
- (i) Find the smallest integer k such that $180k$ is a perfect cube. [1]
- (ii) (a) Express 108 as a product of its prime factors. [1]
- (b) Hence, find the smallest positive value of x such that $108x$ is a multiple of 180. [1]
- (b) Three lasers blink every 42 seconds, 60 seconds and 330 seconds respectively. The last time they blink together was 16 00. What time will all 3 lasers blink together again? [3]
-
- 2 (a) Simplify $\frac{2k+1}{7} - \frac{3k-2}{2}$ [3]
- (b) Solve the equation $2x \div [7 \div (5x \div 4)] = 6$. [3]
-
- 3 (a) Both liquids X and Y used in an experiment were at a temperature of -5.5°C .
- (i) Liquid X was heated until its temperature rose by 7.5°C .
Write down its new temperature. [1]
- (ii) Liquid Y was cooled until its temperature fell by 10°C .
Write down its new temperature. [1]
- (iii) Hence, find the difference between the final temperatures of the two liquids. [1]
- (b) The temperature in Singapore was taken on three successive days.
The temperature on the first day was 1.5°C higher than the second day, and the temperature on the second day was 4.5°C lower than the third day.
- The average temperature of the three days was 33.5°C .
Find the temperature on the second day. [3]
-

- 4 (a) The first four terms of a sequence are 3, 7, 11 and 15.

(i) Write down the 8th term of the sequence. [1]

(ii) Find an expression, in terms of n , for the n th term. [1]

(iii) One of the terms in the sequence is 131. Find the value of n for this term. [1]

- (b) Consider the following number pattern:

$$\begin{aligned} 1 &= 1 \\ 1 + 3 &= 4 \\ 1 + 3 + 5 &= 9 \\ 1 + 3 + 5 + 7 &= 16 \end{aligned}$$

(i) Write down the 5th line and 6th line in the pattern. [2]

(ii) Write down the n th line in the pattern. [2]

(iii) Is it possible to have a k th line of $1 + 3 + 5 + 7 \dots = 305$? Explain your answer. [1]

- 5 (a) Express $3\frac{9}{11}$

(i) as a recurring decimal, [1]

(ii) as a decimal, correct to 5 significant figures. [1]

- (b) Evaluate each of the following without the use of a calculator, leaving your answer as a fraction.

(i) $\frac{23}{25} \div \frac{\square}{\square} - \frac{1\square^2}{5\square} \div \frac{12}{50}$ [2]

(ii) $-(-3)^2 \times \left(\frac{5}{3 + \frac{1}{2}} \right) \times \sqrt[3]{27}$ [2]

- 6 (a) Terrence is planning to bring his family for dinner at a restaurant. Given that the cost of a bowl of noodles is \$7.90 and Terrence orders y number of bowls of noodles,
- (i) form an expression in y for the total amount Terrence paid, [1]
 - (ii) form an inequality in y to determine how many bowls of noodles Terrence can buy if he has only \$50, and [1]
 - (iii) solve the inequality in (a)(ii), and state the maximum number of bowls of noodles he can buy. [2]
- (b) The sum of three consecutive odd numbers is 141. Find the biggest number. [3]
- (c) The sum of the ages of Cindy and her sister is 38.
Seven years ago, Cindy was thrice as old as her sister. Find Cindy's age now. [3]
-
- 7 (a) The marked price of a tour package to Japan is \$1480, inclusive of 7% GST, before the NATAS Fair. During the NATAS Fair, the tour package to Japan is offered at 15% discount. The first 10 customers are also entitled to an additional discount of 10% on the discounted price.
- (i) How much is the tour package to Japan excluding GST before the NATAS fair? [2]
 - (ii) Find the amount paid by the 7th customer. [3]
- (b) Amu scored 36 out of 44 marks in Test A and 48 out of 56 marks in Test B. In which test did Amu do better? Explain your answer. [3]
-

~ End of paper ~

Answer all the questions.

- 1 Calculate $\frac{0.237 + \sqrt{12.5894}}{0.5132 - 1.912^3}$, giving your answer correct to 3 decimal places.

$$= -0.584436 \quad M1$$

Answer -0.584 A1. [2]

- 2 From the following set of numbers

$$-\frac{1}{7}, 0, \sqrt{3}, \sqrt[3]{64}, \pi, 36$$

- (a) Write down

- (i) all the integer(s),

Answer 0, $\sqrt[3]{64}$, 36 B1 [1]

- (ii) all the irrational number(s).

Answer $\sqrt{3}$, π B1 [1]

- (iii) all the perfect square(s).

Answer $\sqrt[3]{64}$, 36 B1 [1]

- (b) Arrange the given set of numbers in descending order.

B1 for 1st no = 36 and

last no = $-\frac{1}{7}$.

Answer 36, $\sqrt[3]{64}$, π , $\sqrt{3}$, 0, $-\frac{1}{7}$ B2 [2]

- 3 Round off the following numbers to 3 significant figures.

- (a) 851 529

Answer 852 000 B1 [1]

- (b) 0.000230127

Answer 0.000230 B1. [1]

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- 4 (a) Find the highest common factor of 272 and 96.

Answer 16 [1]

- (b) Find $\sqrt[3]{1728}$ by using prime factorisation.

$$\sqrt[3]{1728}$$

$$= \sqrt[3]{2^6 \times 3^3} \quad \text{M1.}$$

$$= 2^2 \times 3$$

Answer 12 [M] [2]

$$= 12$$

- 5 The original price of a computer is \$1 890. It was sold to a shop for \$2 190.

- (a) Calculate the percentage increase in the price of the computer.

$$\frac{300}{1890} \times 100\% \quad \text{[M1].}$$

Answer 15.9 % [2]

- (b) In the shop, the marked price of the computer is \$2 888.

A man bought it at a 10% discount during a sale.

Find the amount of profit earned by the shop.

$$\frac{90}{100} \times \$2888$$

$$= \$2599.20 \quad \text{[M1].}$$

$$\$2599.20 - \$2190 = \$409.20$$

Answer \$409.20 [M] [2]

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- 6 (a) Express $2\frac{3}{4}$ as a percentage.

Answer 275. % [1]

- (b) Express 0.84% as a fraction in its simplest form.

Answer $\frac{21}{2500}$ [1]

- (c) Find the fraction which is halfway between $\frac{2}{7}$ and $\frac{3}{7}$.

$$\frac{4}{14} \quad \frac{6}{14}$$

Answer $\frac{5}{14}$ [1]

- 7 Factorise fully

(a) $9xy - 3y$,

Answer $3y(3x-1)$ [1]

(b) $3a(2-b) - 12a(b+3)$.

$$= 3a[(2-b) - 4(b+3)] \quad M1.$$

$$= 3a[2-b-4b-12] \quad M1$$

$$= 3a[-5b-10]$$

$$= -15a(b+2) \quad \underline{\text{or}}$$

Answer $\frac{-15a(b+2)}{15a(-b-2)} \quad \underline{\text{or}} \quad [1]$

$$15a(-b-2)$$

5

8 Simplify

(a) $6x - 3y + 2x + 8z - 2y,$

Answer

$8x - 5y + 8z$ [1]

(b) $\frac{1}{4}x - \frac{1}{2}y + \frac{1}{6}x - \frac{1}{3}y,$

$= \frac{1}{4}x + \frac{1}{6}x - \frac{1}{2}y - \frac{1}{3}y$ M1.

$= \frac{5x}{12} - \frac{5y}{6}$ or $\frac{5x - 10y}{12}$

Answer

$\frac{5x}{12} - \frac{5y}{6}$ (M1) [2]

(c) $\frac{a-1}{2} - \frac{2a-3}{6} - \frac{2(3-a)}{3}.$

$= \frac{3(a-1)}{6} - \frac{2a-3}{6} - \frac{4(3-a)}{6}$ M1.

$= \frac{3a-3-2a+3-12+4a}{6}$ M1.

$= \frac{5a-12}{6}$

A1.

$\frac{5a-12}{6}.$

Answer

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- 9 Cynthia has a box of paper clips.
 12.5% of the paper clips are blue.
 50% of the remaining paper clips are green.
 The rest of the 210 paper clips are red.
 How many paper clips are there in the box altogether?

$$100\% - 12.5\% = 87.5\%$$

$$\frac{50}{100} \times 87.5\% = 43.75\%$$

$$100\% - 12.5\% - 43.75\% = 43.75\% \quad \text{M1.}$$

$$43.75\% \text{ rep } 210 \text{ M1.}$$

Answer 480. clips [3]

- 10 Solve the following equations.

(a) $4x - 5 = x + 3,$

$$4x - x = 5 + 3 \quad \text{M1.}$$

$$3x = 8$$

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

Answer $x = 2\frac{2}{3}$ [2]

(b) $\frac{4x}{5} + \frac{2(x-1)}{3} = 3.$

$$3(4x) + 10(x-1) = 3(15) \quad \text{M1}$$

$$12x + 10x = 45 + 10 \quad \text{M1}$$

$$22x = 55$$

$$x = 2.5$$

Answer $x = 2.5 \quad \text{A1}$ [3]

7

- 11 A shopkeeper bought 60 oranges for $\$ \frac{x}{6}$ each. He then sold them for $\$ \frac{x}{2}$ each.
- (a) Find an expression, in terms of x , for the profit he makes if he sold all oranges. Give your expression in its simplest form.

$$\begin{aligned} \$ \frac{x}{6} \times 60 &= \$10x \\ \frac{x}{2} \times 60 &= \$30x \end{aligned} \quad \left. \begin{array}{l} \\ \end{array} \right\} \text{MI}$$

Answer $\$ \dots 20x \dots$ [2]

$$30x - 10x = 20x$$

- (b) Given that the shopkeeper made a profit of \$60, form an equation in x and solve for x .

$$20x = 60$$

$$x = 3.$$

Answer $x = \dots 3 \dots$ [1]

- 12 (a) Solve the inequality $-3x \leq -13$.

Answer $\dots x \geq 4\frac{1}{3} \dots$ [1]

- (b) Hence, write down the smallest value of x which satisfies $-3x \leq -13$ if

- (i) x is a prime number,

$$3x \geq 13$$

$$x \geq 4\frac{1}{3}$$

Answer $x = \dots 5 \dots$ [1]

- (ii) x is a perfect cube,

Answer $x = \dots 8 \dots$ [1]

- (iii) x is a rational number,

Answer $x = \dots 4\frac{1}{3} \dots$ [1]

13 It is given that $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$.

(a) Find f when $u = 4$ and $v = 5$.

Answer

$$2\frac{2}{9}$$

A1.

[1]

(b) Find u when $f = 5$ and $v = 7$.

$$\frac{1}{u} = \frac{1}{5} - \frac{1}{7}$$

M1

$$\frac{1}{u} = \frac{2}{35}$$

Answer

$$17.5 \text{ A1.}$$

[2]

$$u = 17.5$$

- 14 Two different sizes of shampoo are shown below.
The volumes of the shampoo and the prices are shown respectively.
Which size of shampoo gives the better value? You must show all your working clearly.



Answer: $(\$7.80 \div 3) \times 5 = \13 [M1]

OR $(\$10.50 \div 5) \times 3 = \6.30 [M1]

The big bottle is cheaper [A1].

[3]

2017 Secondary One Express SA1 Answers:

1)a (i)	$2 \times 3 \times 5^2 = 150$	B1
a(ii)	a) $108 = 2^2 \times 3^3$	B1
	b) 5	B1
b)	LCM = $2^2 \times 3 \times 5 \times 7 \times 11$ = 4620 4620s = 77 mins (1 h 17 mins) 16 00 $\rightarrow$ 17 17	M1 M1 A1
2)a)	$\frac{2k+1}{7} - \frac{3k-2}{2}$ $= \frac{2(2k+1) - 7(3k-2)}{14}$ $= \frac{4k+2-21k+14}{14}$ $= \frac{-16-17k}{14}$	M1 M1 A1
b)	$2x - [7 - 5x + 4] = 6$ $2x - [11 - 5x] = 6$ $2x - 11 + 5x = 6$ $7x = 17$ $x = 2.43 \text{ or } 2\frac{3}{7}$	M1 M1 A1
3)a)(i)	$-5.5 + 7.5 = 2^\circ\text{C}$	B1
(ii)	$-5.5 - 10 = -15.5^\circ\text{C}$	B1
(iii)	17.5°C	B1
(b)	$x - 3 + x - 4.5 + x = 100.5$ $3x = 108$ $x = 36$ $36 - 4.5 = 31.5^\circ\text{C}$	M1 M1 A1
4)a)(i)	31	B1
(ii)	$4n - 1$	B1
(iii)	33	B1
b)(i)	$1 + 3 + 5 + 7 + 9 = 25$ $1 + 3 + 5 + 7 + 9 + 11 = 36$	B1 B1
(ii)	$1 + 3 + 5 + 7 + \dots + 2n - 1 = n^2$	B1/B1
(iii)	No. 305 is not a perfect square.	B1
5)a) (i)	3.81 (with a dot on top of 8 and 1)	A1
(ii)	3.8182	A1
b)(i)	$\frac{23}{25} - \frac{1}{25} \times \frac{50}{12}$ $= \frac{23}{25} - \frac{2}{12}$ $= \frac{113}{150}$	M1 A1
(ii)	$-9 \times (\frac{5}{3.5}) \times 3$ $= -9 \times 1\frac{3}{7} \times 3$ $= -38\frac{4}{7}$	M1 A1

6)a)(i)	\$7.90 y	A1
(ii)	$7.90 y \leq 50$	A1
(iii)	$y \leq \frac{50}{7.90}$ $y \leq 6.33$ $y = 6$	M1 A1
b)	Let x be the smallest number $x + x + 2 + x + 4 = 141$ $3x + 6 = 141$ $3x = 135$ $x = 45$ Biggest number = 49	M1 A1 A1
c)	Let Cindy's sister's age 7 years ago be x. $3x + x = 24$ $x = 6$ $18 + 7 = 25$	M1 A1 A1
7)a)(i)	$\frac{1480}{107} \times 100 = \1383.18	M1/A1
(ii)	$\frac{85}{100} \times 1383.18 = \1175.70 $\frac{90}{100} \times \frac{85}{100} \times 1383.18 = \1058.13 $1.07 \times \$1058.13 = \1132.20	M1 M1 A1
b)	$\frac{36}{44} \times 100\% = 81.8\%$ $\frac{48}{56} \times 100\% = 85.7\%$ Amu did better in test B.	M1 M1 A1