Name: _____ Index No:_____

Anglo-Chinese School (Barker Road)

END-OF-YEAR EXAMINATION 2020

SECONDARY ONE EXPRESS

MATHEMATICS PAPER 1

1 HOUR 15 MINUTES

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your index number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, 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 loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give your 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 examinations, fasten your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 50.

For Examiner's Use

Answer **all** the questions.

For Examiner's Use

1 **(a)** Calculate $\dfrac{13.6^2-4}{\sqrt{3.5}+3}$.

Write down the first 5 digits on your calculator display.

Answer _____ [1]

(b) Write your answer to part (a) correct to 3 decimal places.

Answer _____ [1]

For Examiner's Use

2 By rounding off each number to 2 significant figures, estimate the value of

$$51323 \div 9.96$$

You must show your working clearly.

Answer _____ [2]

3 Simplify $2y+3(y+4x)$.

Answer _____ [2]

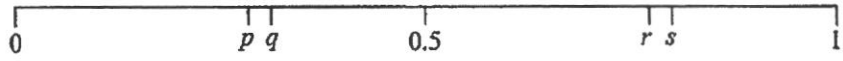
For Examiner's Use

4 Factorise completely $24ax - 16ay$.

For Examiner's Use

Answer _____ [2]

5 The numbers p, q, r and s are represented on the number line.



The values of p, q, r and s are listed below.

$\frac{1}{3}$ 33.3% $\frac{\sqrt{2}}{2}$ $\frac{\pi}{4}$

Find p, q, r and s.

Answer $p =$ _____

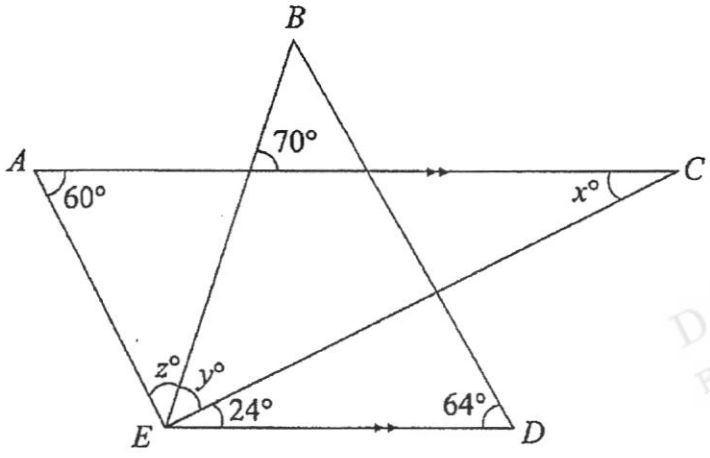
$q =$ _____

$r =$ _____

$s =$ _____ [2]

For Examiner's Use

6 The diagram below is formed by two triangles BDE and ACE.
AC is parallel to ED.



For Examiner's Use

(a) Find

(i) x,

Answer $x =$ _____ [1]

(ii) y,

Answer $y =$ _____ [1]

(iii) z.

Answer $z =$ _____ [1]

(b) Explain if AE is parallel to BD.

Answer

_____

_____

_____

_____ [1]

For Examiner's Use

7 Express $\frac{7x}{3} - \frac{2x-y}{2}$ as a single fraction in its simplest form.

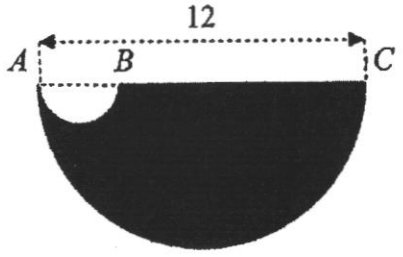
For Examiner's Use

Answer _____ [3]

8 The diagram shows a semi-circle with diameter $AC = 12$ cm.

$AB = \frac{1}{4} AC$ and a semi-circle is drawn with AB as the diameter.

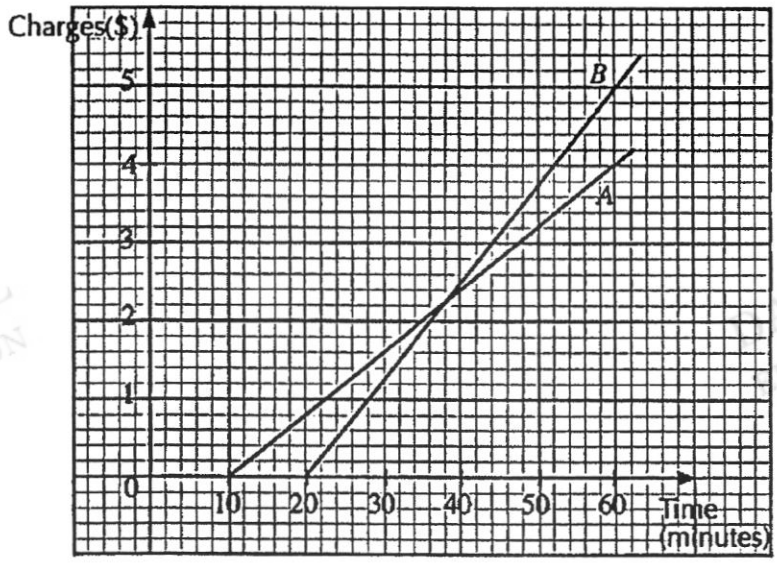
Find the perimeter of the shaded region.



Answer _____ cm [3]

For Examiner's Use

9 Two gyms, A and B, offer usage charges as shown in the graphs.



(a) How much does Gym A charge for usage for 20 minutes?

Answer $ _____ [1]

(b) Jim would like to spend $4 to use one of the gyms.
Which gym offers more usage time?

Answer Gym _____ [1]

(c) Provide a possible explanation as to why the graph for Gym B only starts at 20 minutes.

Answer

_____

_____

_____ [1]

For Examiner's Use

10 Ben went on a trip to New York.
The exchange rate was Singapore dollars (SGD) 1 = US dollars (USD) 0.7312.

(a) Ben exchanged SGD 4500 for USD.
Calculate the amount of USD he had received. Give your answer to 2 decimal places.

Answer USD _____ [1]

(b) Ben had USD 1500 remaining after his trip. He exchanged them back to SGD. The exchange rate remained at SGD 1 = USD 0.7312.
Calculate the amount he had spent on his trip, to the nearest SGD.

Answer SGD _____ [2]

11 Adam, Ben and Cayden share a sum of money.
The ratio of Adam's money to Ben's is in the ratio 3 : 5.
Cayden has 1.5 times the money that Ben has.

(a) Find the ratio of Adam's money to Ben's money to Cayden's money.

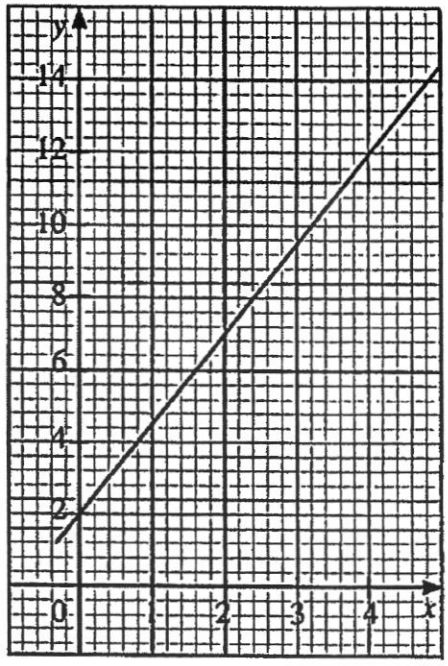
Answer _____ : _____ : _____ [2]

(b) If Cayden has $90 more than Adam, find the total amount of money the three of them have.

Answer $ _____ [2]

For Examiner's Use

12



For Examiner's Use

(a) Find the gradient of the line.

Answer _____ [1]

(b) Write down the y-intercept of the line.

Answer _____ [1]

(c) Write down the equation of the vertical line that passes through (2 , 0).

Answer _____ [1]

For Examiner's Use

13 The temperature of a waffle was – 6D when it was taken from the freezer.
The waffle was placed in an oven.
The temperature rose at a constant rate for 10 minutes.
At the end of 10 minutes, the temperature was 18D.

Find

(a) the temperature after 5 minutes,

Answer _____ D [2]

(b) the number of minutes it took to reach 0D.

Answer _____ minutes [2]

For Examiner's Use

14 **(a)** $w = \frac{1}{3}(a^2 + b)$.

Find the value of w if $a = -2$ and $b = 3$.

Answer $w =$ _____ [2]

(b) Solve $\frac{32}{x-3} = 8$.

Answer $x =$ _____ [2]

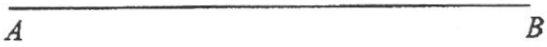
For Examiner's Use

For Examiner's Use

15 **(a)** Construct quadrilateral $ABCD$ such that $BC = 6$ cm, $AD = 7$ cm, angle $ABC = 100°$ and angle $BAD = 80°$.
AB has already been drawn below.

For Examiner's Use

Answer



[2]

(b) Measure and write down the length of the diagonal AC.

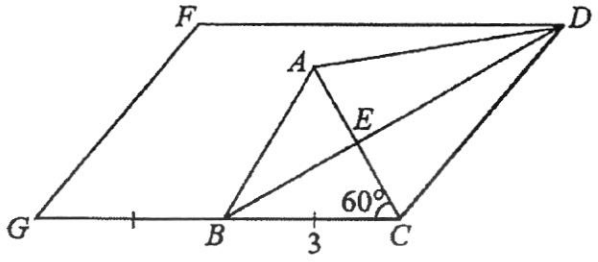
Answer $AC =$ _____ cm [1]

(c) Measure and write down the size of angle ADC.

Answer angle $ADC =$ _____ ° [1]

For Examiner's Use

16 $ABCD$ is a kite. $CDFG$ is a parallelogram.
$GB = BC = 3$ cm, angle $BCA = 60°$ and area of triangle $ABD = 12$ cm^2.



(a) Find

(i) AB,

Answer $AB =$ _____ cm [1]

(ii) angle CBE.

Answer angle $CBE =$ _____ ° [2]

(b) Find the area of parallelogram $CDFG$.

Answer _____ cm^2 [2]

End of Paper

Name: _____ Index No:_____

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SECONDARY ONE EXPRESS

MATHEMATICS PAPER 2

1 HOUR 15 MINUTES

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For Examiner's Use

Answer **all** the questions.

For Examiner's Use

1 The first three terms in a sequence of numbers, T_1, T_2, T_3, ... are given below:

$T_1 = 1 + 3 = 4$
$T_2 = 4 + 5 = 9$
$T_3 = 9 + 7 = 16$

(a) Find T_4.

Answer $T_4 =$ ..... [1]

(b) Find an expression, in terms of n, for T_n.

Answer $T_n =$ ..... [2]

(c) Evaluate T_{40}.

Answer $T_{40} =$ ..... [1]

For Examiner's Use

For Examiner's Use

2 Written as a product of its prime factors, $56 = 2^3 \times 7$.

(a) Find k such that $56k$ is both a perfect square and a perfect cube.

Answer $k =$ ..... [1]

(b) Express 42 as a product of its prime factors. Give your answer in index notation.

Answer $42 =$ ..... [1]

(c) Find the highest common factor of 42 and 56.

Answer ..... [1]

(d) Two alarm clocks are set to ring at intervals of 42 minutes and 56 minutes respectively. If the alarm clocks ring together at 0830, at what time will they next ring together again?

Answer ..... [2]

For Examiner's Use

For Examiner's Use

3 Harry drives at an average speed of x km/h for half an hour and then for another 20 minutes at an average speed of $1.2x$ km/h.

(a) Find the distance travelled, in km, in the first half an hour.
Give your answer in terms of x.

Answer ..... km [1]

(b) Show that the total distance travelled for the whole journey is $0.9x$ km.

Answer

[1]

For Examiner's Use

(c) Given that the average speed for the entire journey was 80 km/h, form an equation in x and solve the equation.

Answer $x =$ ..... [4]

(d) Harry says that he will reach his destination earlier if he drives at a **constant** speed of 80 km/h.
Is his statement reasonable? Explain your answer.

Answer.....

.....

.....

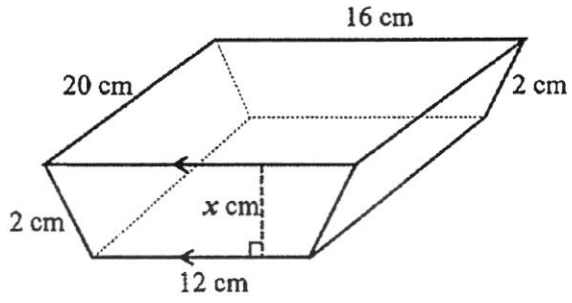
.....

.....

..... [1]

For Examiner's Use

4 The figure shows a solid metal in the form of a trapezoidal prism.



(a) Given that the volume of the solid is 1680 cm^3, show that $x = 6$.

Answer

[2]

For Examiner's Use

(b) Calculate the cost of painting the solid if the paint costs \$2 per cm^2.

For Examiner's Use

Answer \$ ..... [3]

(c) The solid is then melted and made into cubes with sides of 5 cm.

Calculate the maximum number of cubes that can be made.

Answer ..... [3]

For Examiner's Use

5 The variables x and y are connected by the equation $y = 2x - 6$.
The table shows some corresponding values of x and y.

x	–3	–1	0	1
y	–12	p	–6	–4

(a) Find the value of p.

Answer $p =$ ..... [1]

(b) On the axes in the next page, plot the points given in the table and join them with a straight line. [2]

(c) From your graph,

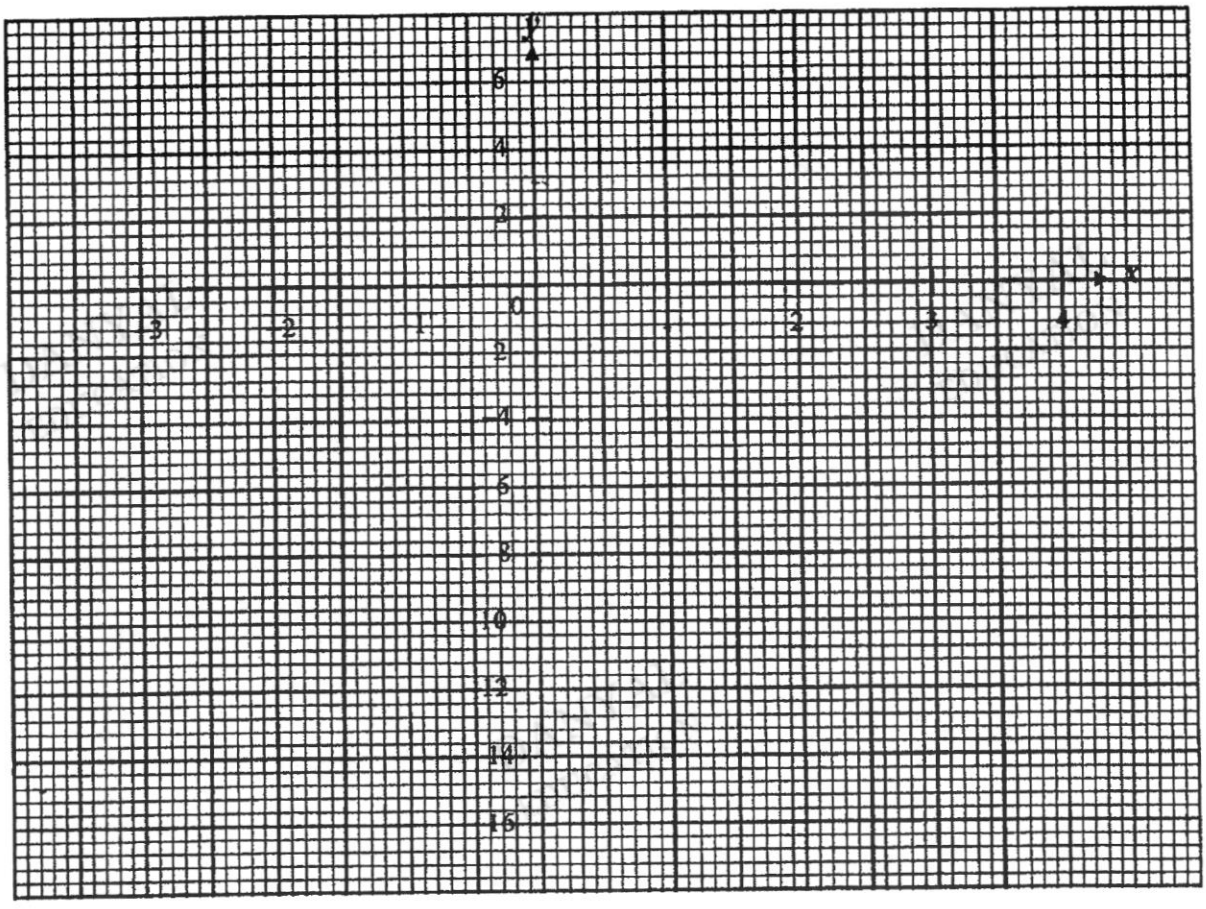
(i) write down the coordinates of the point where the line meets the x-axis,

Answer (..... , ...) [1]

(ii) find the value of x when $y = -2$.

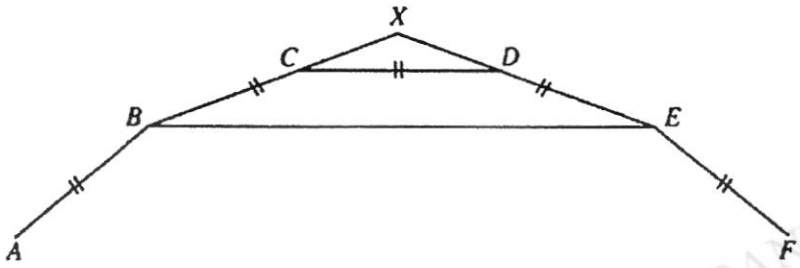
Answer $x =$ ..... [1]

5(b) *Answer*



For Examiner's Use

6 The diagram shows part of a regular polygon $ABCDEF\ldots$, which has 12 sides. BCX and EDX are straight lines.



Showing your working, find

(a) angle XDC,

Answer angle XDC = ... ° [2]

(b) angle DXC,

Answer angle DXC = ... ° [1]

(c) angle BEF.

Answer angle BEF = ... ° [2]

For Examiner's Use

7 (a) The cash price of a new laptop is \$2499.
Jim buys this computer on hire purchase.
He pays a deposit of 10% of the cash price followed by 24 monthly instalments of \$114 each.

(i) Find the total amount that Jim will pay for the laptop.

Answer \$ ..... [2]

(ii) Find the cost of buying the laptop on hire purchase as a percentage of the cash price.

Answer ..... % [2]

(b) \$6000 was deposited into a bank.
The simple interest earned at the end of 8 years was \$72.
Calculate the yearly interest rate given by the bank.

Answer ..... % [2]

For Examiner's Use

(c) Belle took a Mathematics test that consists of 2 sections.
Section A has 20 questions and Section B has 10 questions.
1 mark is awarded for each question answered correctly.

(i) She answered 80% of the questions in Section A correctly.
Find the number of questions in Section A that she answered correctly.

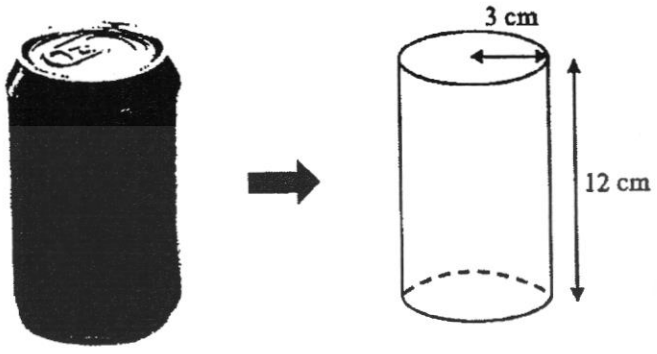
Answer ..... [1]

(ii) Find the percentage of the questions in Section B that she needs to answer correctly in order to score 70% for the entire test.

Answer ..... % [3]

For Examiner's Use

8 The figure shows ***Soda Can A***, which can be modelled as a cylinder of height 12 cm and radius 3 cm.



Soda Can A

(a) Using the model, show that the volume of the ***Soda Can A*** is 108π cm^3.

Answer

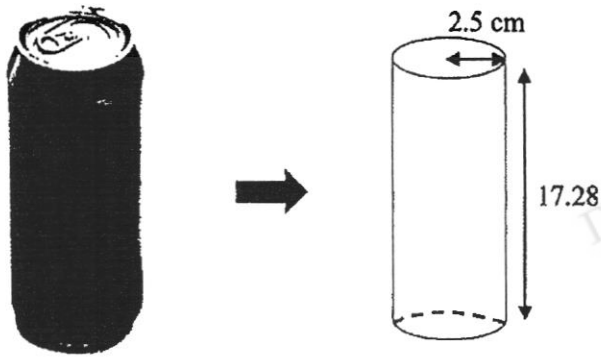
[1]

(b) Using the model, estimate the total surface area of the ***Soda Can A***, in cm^2.

Answer ..... cm^2 [2]

For Examiner's Use

(c) The figure shows another ***Soda Can B***, which can be modelled as a cylinder of height 17.28 cm and radius 2.5 cm.
The volume of the *Soda Can B* is 108π cm^3 and its total surface area is 98.9π cm^2.



Soda Can B

(i) As a manufacturer of drink cans, which design will you use? Justify your answer.

Answer Soda Can ..... because.....

.....

.....

..... [1]

(ii) The smaller the volume to surface-area ratio, the faster the soda drink can will cool down in the freezer.
Determine which Soda Can will cool down faster in the freezer.
Show your working clearly.

Answer Soda Can ..... [2]

End of Paper

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Mathematics Paper 1 Marking Scheme
Secondary 1 Express
EOY Exam 2020

Qn		Steps/Answer
1	(a)	37.151
	(b)	37.152
2		$51000 \div 10$ $=5100$
3		$2y+3y+12x$ $=5y+12x$
4		factor of 8 or a seen $=8a(3x-2y)$
5		$p=33.3\%,\ q=\frac{1}{3},\ r=\frac{\sqrt{2}}{2},\ s=\frac{\pi}{4}$
6	(a)	$x=24°$
	(b)	$y=70-24=46°$
	(c)	$z=180-60-24-46=50°$ Interior angles, AE // BD
	(d)	AE is not parallel to BD as the interior angles do not add up to 180°
7		$\frac{7x}{3}-\frac{2x-y}{2}$ $=\frac{2(7x)}{6}-\frac{3(2x-y)}{6}$ $=\frac{14x-6x+3y}{6}$ $=\frac{8x+3y}{6}$
8		$\frac{1}{2}[2\pi(6)]+\frac{1}{2}[2\pi(1.5)]+9$ $=32.6$ cm
9	(a)	\$0.80
	(b)	A
	(c)	The usage is free for the first 20 minutes.
10	(a)	4500 x 0.7312 = USD 3290.40
	(b)	1500 ÷ 0.7312 = SGD 2051.4223 SGD (4500 - 2051.4223) = SGD 2449
11	(a)	A : B : C 3 : 5 2 : 3 6 : 10 : 15
	(b)	\$90 is 15–6=9 parts Total amount = \$310

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Mathematics Paper 1 Marking Scheme
Secondary 1 Express
EOY Exam 2020

12	(a)	$\frac{12-2}{4}$ $=2.5$
	(b)	$y=2$
	(c)	$x=2$
13	(a)	$18-(-6)=24°C$ 10 minutes increase of 24°C 5 minutes increase of 12°C Final temperature $(-6)+12=-6°C$
	(b)	$0-(-6)=6°C$ Time taken $=\frac{6}{24}\times 10$ $2\frac{1}{2}$
14	(a)	$w=\frac{1}{3}[(-2)^2+3)$ $=\frac{7}{3}$
	(b)	$32=8(x-3)$ $32=8x-24$ $8x=56$ $x=7$
15	(a)	Point C Point D
	(b)	10.4 (range 10.3 – 10.5)
	(c)	92° (range 91° – 93°)
16	(a) (i)	$AB=BC=3$ cm
	(ii)	angle $CBE=(180-60-90)°$ $=30°$
	(c)	Area of triangle BCD = Area of triangle ABD = 12 cm^2 (property of kite) Height of parallelogram = height of triangle BCD $=12\div\left(3\times\frac{1}{2}\right)=8$ cm Area of $CDFG=8\times 6=48\ cm^2$. <u>Or</u> By observation, 4 x area of triangle BCD = area of $CDFG$. area of $CDFG$ = 4 x 12 = 48 cm^2.

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Mathematics Paper 2 Marking Scheme
Secondary 1 Express
EOY Exam 2020

Qn			Steps/Answer
1		(i)	25
		(ii)	$T_n = n^2+2n+1$
		(iii)	$T_{40} = 1681$
2	(a)		$k = 2^3 \times 7^5 = 134456$
	(b)		$42 = 2\times3\times7$
	(c)		14
	(d)		LCM = 168 1118
3		(a)	$\frac{1}{2}x$
		(b)	Total distance traveled : $\frac{1}{2}x+0.4x$ $=0.9x$ (shown)
		(c)	$0.9x \div \frac{5}{6} = \frac{27}{25}x$ $\frac{27}{25}x = 80$ $x = 80 \div \frac{27}{25}$ $x = 74.074$ $x = 74.1$
		(d)	Statement is not reasonable as e.g. Car starts from 0 km/h e.g. Car will have to stop at traffic junctions *or equivalent explanations*
4	(a)		Area of cross-section = $\frac{1}{2}(12+16)(6) = 84$ Volume of solid = 84×20 $= 1680\ cm^3$
	(b)		Total surface area = $(84\times2)+(20\times2)(2)+(20\times16)+(20\times12)$ *or* $(84\times2)+(2+16+2+12)(20)$ $=808\ cm^2$ Cost of paint = $\$(2\times808) = \$1616$
	(c)		Volume of cube = 5^3 No. of cubes $= 1680 \div 5^3 = 13.44$ Maximum number = 13

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Mathematics Paper 2 Marking Scheme
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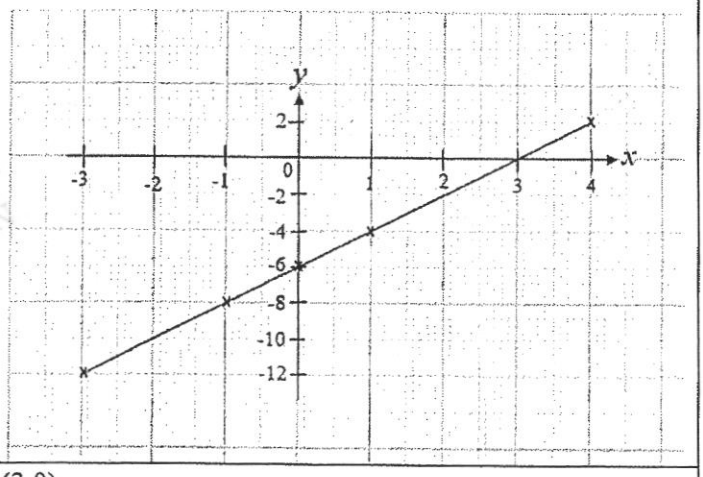
5	(a)		Graph $p = -8$
	(b)		Points correctly plotted Straight line joining all points 
	(c)		(3,0)
	(d)		$x = 2$
6	(a)		$\angle CDE = \frac{(12-2)\times 180}{12} = 150°$ $\angle XDC = 180 - 150 = 30°$ Or $\angle XDC = \frac{360}{12}$ (using sum of exterior angles) $= 30°$
	(b)		$\angle DXC = 180 - (30 \times 2) = 120°$
	(c)		$\angle DEF = \angle CDE = 150°$ $BCX = EDX$ $\angle DEB = \frac{180 - \angle DXC}{2} = 30°$ (base angles of isosceles triangle BXE) $\angle BEF = 150 - 30 = 120°$

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Mathematics Paper 2 Marking Scheme
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7	(a)	(i)	Total installments : $24 \times \$114 = \$2736$ Total amount paid : $249.90 + 2736 = \$2985.90$
		(ii)	Percentage $= \dfrac{2985.90}{2499} \times 100\%$ $= 119\%$
	(b)		$72 = \dfrac{6000 \times r \times 8}{100}$ $r = 0.15$
	(c)		Questions answered correctly $= \dfrac{80}{100} \times 20$ $= 16$
	(d)		Target score $= \dfrac{70}{100} \times 30$ $= 21$ Percentage of remaining 10 qns $= \dfrac{21-16}{10} \times 100\%$ $= 50\%$
8	(a)		$Volume, A = \pi(3)^2 \times 12$ $= 108\pi$
	(b)		$Area, A = \pi(3)^2 \times 2 + 2\pi(3) \times 12$ $= 90\pi$ $= 283\ \text{cm}^2$
	(c)	(i)	**Soda Can A** as it has a smaller surface area and hence will be **cheaper** to manufacture
		(ii)	Can A: Volume-to-Area $= \dfrac{108}{90} = 1.2$ Can B: Volume-to-Area $= \dfrac{108\pi}{98.9\pi} = 1.09$ Can B will cool down faster.