CANDIDATE NAME		( )	CLASS	

Anglo-Chinese School (Barker Road)

END-OF-YEAR EXAMINATION 2021
SECONDARY THREE EXPRESS

MATHEMATICS 4048
PAPER 1

1 HOUR 30 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 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.

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 60.

For Examiner's Use

This question paper consists of **14** printed pages.

Mathematical Formulae

Compound interest

$$\text{Total amount} = P\left(1+\frac{r}{100}\right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi rl$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2}ab\sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2}r^2\theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

1 **(a)** Calculate $\dfrac{-2.5^2+\sqrt{49}}{3-1.098}$.
Write down the first five digits of your answer.

Answer _____ [1]

(b) Write your answer in **(a)** correct to 3 significant figures.

Answer _____ [1]

---

2 **(a)** Express 1188 as a product of its prime factors.

Answer _____ [1]

(b) Using your answer to part **(a)**, explain why 1188 is not a perfect cube.

Answer

_____

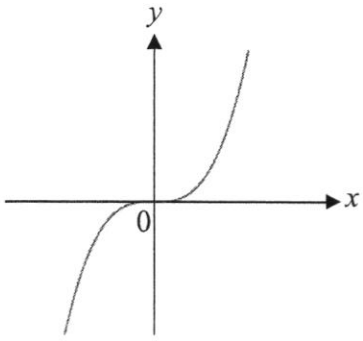
_____ [1]

---

3 Y is inversely proportional to the cube of x.
The value of Y is 18 for a particular value of x.
Find the value of Y if x is three times its original value.

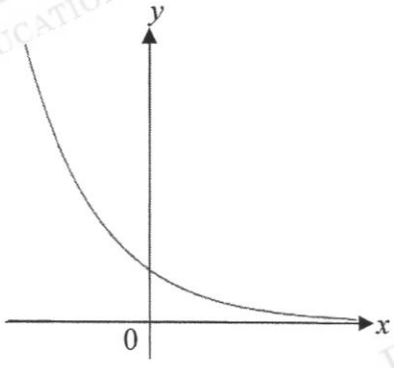
Answer _____ [2]

4 **(a)** The sketch represents the graph of $y = x^n$.
Write down the value of n.



Answer $n =$ _____ [1]

(b) Write down a possible equation for the graph below.



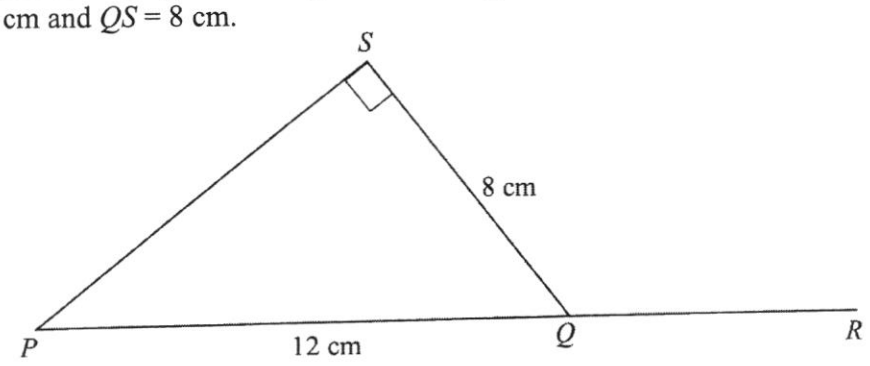
Answer _____ [1]

---

5 Due to the Covid-19 pandemic, Mr Ong's monthly revenue for his food business was reduced by 60%. The revenue last month was \$5000. Find the original amount of revenue that he could earn before the pandemic.

Answer \$_____ [2]

6 In the figure below, PQR is a straight line and PQS is a right–angled triangle.
$PQ = 12$ cm and $QS = 8$ cm.



Giving your answer as a fraction in its lowest form, find the value of

(a) $\sin \angle SPQ$

Answer _____ [1]

(b) $\cos \angle SQR$

Answer _____ [1]

---

7 The first five terms of a sequence are

$$\frac{1}{2}, \frac{2}{5}, \frac{3}{8}, \frac{4}{11}, \frac{5}{14}, \ldots$$

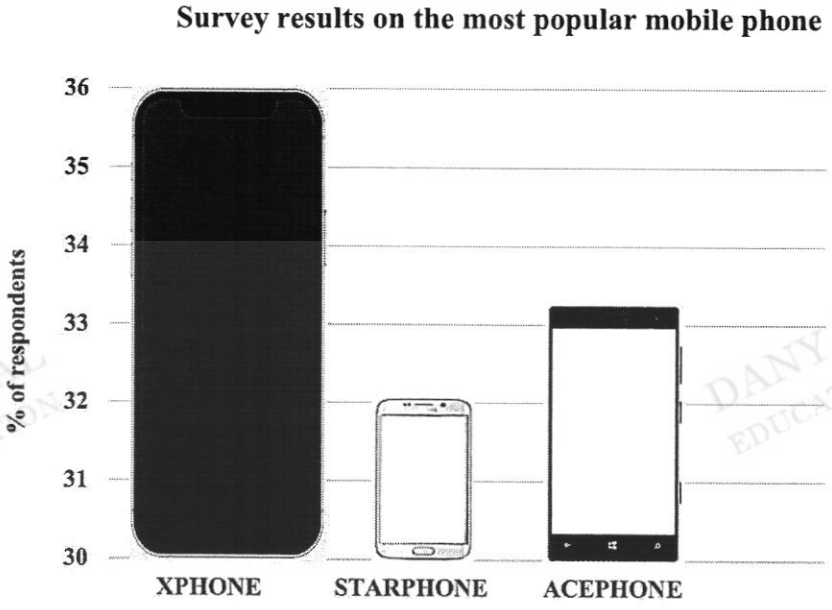
(a) Write down the next term.

Answer _____ [1]

(b) Write down the n^{th} term.

Answer _____ [1]

8 Patrick conducted a survey in his class to find out about the most popular mobile phone. The results were shown in the graph below.



(a) State one misleading feature of the graph.

Answer

_____

_____ [1]

(b) Explain how this feature may affect the readers' interpretation of the graph.

Answer

_____

_____

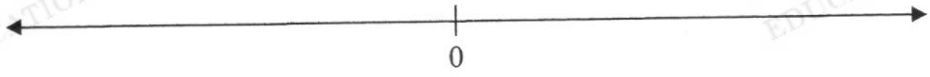
_____ [1]

9 **(a)** Solve the inequality $-\frac{1}{2} < 3x - 4 \leq 8$.

Answer _____ [2]

(b) Represent your answer above on the number line below. [1]

Answer



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10 The table below shows information about the public transport ridership in Singapore.

Year	2015	2016
Bus	3.81×10^6	3.93×10^6
MRT	2.879×10^6	3.095×10^6
Taxi	1.01×10^6	9.54×10^5
LRT	1.53×10^5	1.8×10^5

(a) Calculate how many more people travelled by bus in 2016 than in 2015. Give your answer in standard form.

Answer _____ [1]

(b) Calculate the percentage decrease in the taxi ridership from 2015 to 2016.

Answer _____% [2]

11 A polygon has n sides.
Four of its interior angles are 120°,125°,140° and 155°.
The other interior angles are 135° each.
Calculate the value of n.

Answer $n =$ _____ [3]

---

12 The scale of a map is 5 cm : 2 km.

(a) Write this scale in the form 1 : n.

Answer 1 : _____ [1]

(b) The actual area of a garden is 1.37 km^2.
Calculate the area, in square centimetres, of the garden on the map.

Answer _____ cm^2 [2]

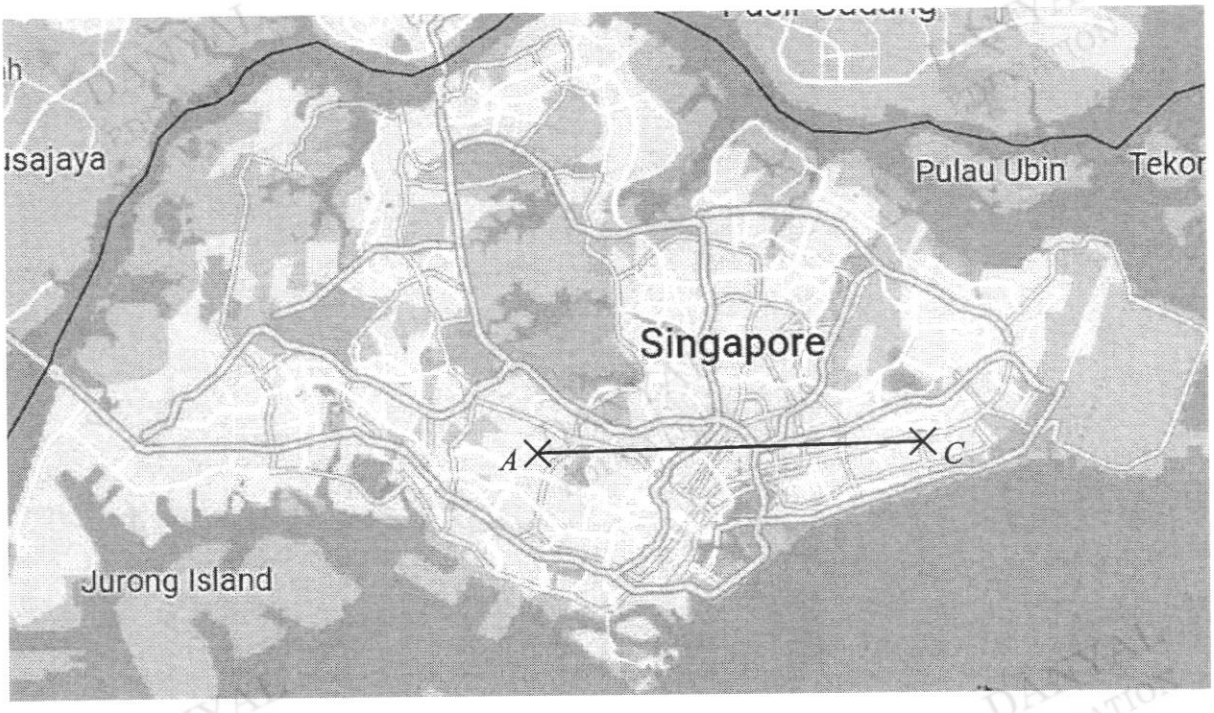
13 The diagram below shows a map of Singapore. Joe is staying at point A, Elliot is staying at point B and Thaddeus is staying at point C.

Using suitable methods of construction with a ruler and a pair of compasses,

(a) locate where Elliot is staying and label it with 'B' given that $\angle BAC = 50°$ and $\angle ACB = 53°$, and [1]

(b) find the best place for Joe, Elliot and Thaddeus to meet so that everyone travels an equal distance to the meeting place. Label the best place with *'M'*. [2]

Answer (a), (b)



14 A piece of plastic toy has a mass of 88 grams, correct to the nearest gram.

(a) Find the range of possible mass of the plastic toy.

Answer _____ [1]

(b) The volume of the plastic toy is 100 cm^3, correct to the nearest cubic centimetres. Find the greatest possible mass of 1 cubic centimetre of the plastic toy.

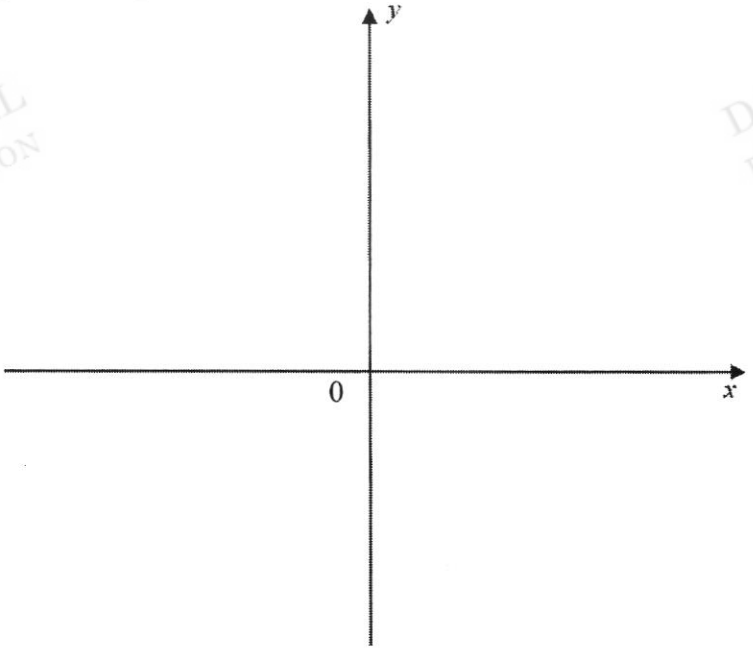
Answer _____ g/cm^3 [2]

---

15 **(a)** Express $x^2 - 6x + 6$ in the form of $(x+a)^2 + b$.

Answer _____ [2]

(b) Hence, sketch the graph of $y = x^2 - 6x + 6$, indicating all the intercepts and turning point clearly.



[2]

---

16 Factorise the following completely.

(a) $10xy+15y-12x-18$

Answer _____ [2]

(b) xy^3-x^3y

Answer _____ [2]

---

17 **(a)** Simplify $\left(-3q^2r^{-2}\right)^2$, leaving your answer in positive index.

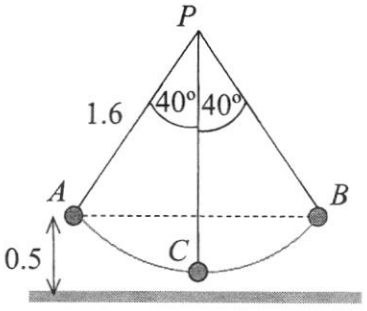
Answer _____ [2]

(b) Given that $7^k=\sqrt{343}$, find the value of k.

Answer $k=$ _____ [2]

18 One end of a piece of string of length 1.6 m is fixed to a point P. A ball is attached to the other end and its centre moves along a circular arc between A and B, the two extreme positions of its path. The point C is the lowest position of the path of the centre of the ball.

In the extreme positions A and B, the centre of the ball is 0.5 m above the horizontal ground and the string makes an angle of 40° with the vertical.



(a) Calculate the distance travelled by the ball as it travels from A to B.

Answer _____ m [2]

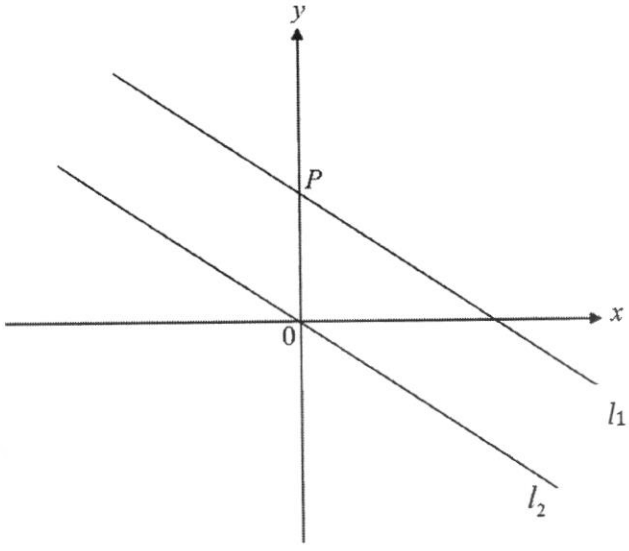
(b) Explain, with calculation, if the ball would collide with a 12 cm tall statue, that is placed under C.

Answer

_____

_____ [3]

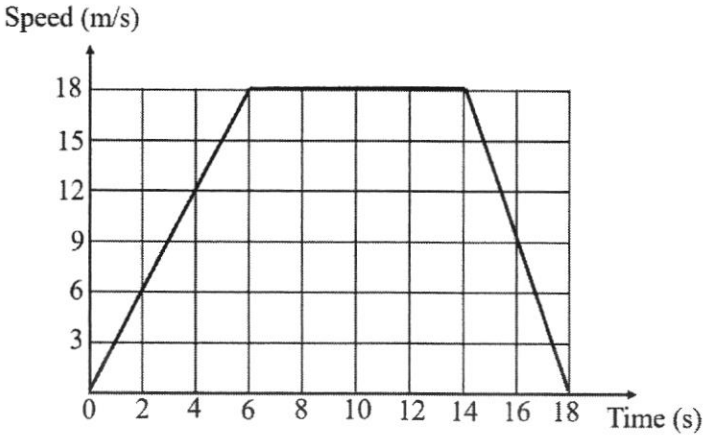
19 The diagram below shows the line l_1 which intersects the x-axis and y-axis at points Q and P respectively. Line l_2 is parallel to line l_1.



Given that the length of PQ is 5 units and the equation of line l_2 is $y = -\frac{4}{3}x$, find the coordinates of P.

Answer P (_____, _____) [4]

20 The speed-time graph below shows the speed of a van over a period of 18 seconds.



(a) Describe the motion of the van from $t = 6$ seconds to $t = 14$ seconds.

Answer

_____

_____ [1]

(b) Find the speed of the van at 14.5 seconds.

Answer _____ m/s [2]

(c) Find the average speed of the van for the whole journey.

Answer _____ m/s [2]

End of Paper

CANDIDATE NAME		( )	CLASS	

Anglo-Chinese School (Barker Road)

END-OF-YEAR EXAMINATION 2021
SECONDARY THREE (EXPRESS)

MATHEMATICS 4048
PAPER 2

2 HOURS

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

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

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 80.

For Examiner's Use

This question paper consists of **19** printed pages and **1** blank page.

Mathematical Formulae

Compound interest

$$\text{Total amount} = P\left(1+\frac{r}{100}\right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi rl$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

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$$\text{Area of triangle } ABC = \frac{1}{2}ab\sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

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Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

1 **(a)** Express $\frac{3}{2x-5}-\frac{1}{5+x}$ as a single fraction in its simplest form.

Answer _____ [2]

(b) Simplify $\frac{5a^2b^2c}{2a^3}\div\frac{-(2b)^3}{9c}$.

Answer _____ [3]

(c) It is given that $A = \frac{3}{2}\left(\frac{p^2 - q^2}{r}\right)$

(i) Find A when $p = 2$, $q = -1$ and $r = 5.5$.

Answer _____ [1]

(ii) Express q in terms of A, p and r.

Answer _____ [3]

2 27 students in a class sat for a Mathematics Weighted Assessment and Science Weighted Assessment. The maximum mark for each of the Weighted Assessment was 40 marks. Their marks were represented in the stem and leaf diagram below.

Mathematics		Science
9 8 7 5 1	1	0 2 3 8 8 9
9 9 8 6 5 5 5 3 2 1 0	2	0 0 1 1 2 3 5 6 8 8
8 8 7 7 6 5 5 3 2 2 1	3	2 2 2 2 4 5 6 6 6 7 9

Key: 1 | 3 | 2 means a score of 31 for Mathematics and a score of 32 for Science

Using the stem and leaf diagram, find the

(a) **(i)** mean mark for the Mathematics Weighted Assessment,

Answer _____ [1]

(ii) median mark for the Mathematics Weighted Assessment,

Answer _____ [1]

(iii) modal mark for the Science Weighted Assessment.

Answer _____ [1]

(b) Calculate the percentage of students who scored more than 30 marks in Mathematics Weighted Assessment.

Answer _____% [1]

(c) Which subject did the students do better in? Explain your answer.

Answer

_____ because _____

_____

_____ [2]

(d) A distinction is awarded to scores more than 28 marks.
Find the probability that a student chosen at random scored a distinction grade for the Science Weighted Assessment.

Answer _____ [1]

(e) There was an error in the calculation for the Mathematics Weighted Assessment. Two marks were added to all of the students in the class.
State how the mean and range of the Mathematics Weighted Assessment would be affected by this addition.

Answer

_____

_____

_____

_____ [2]

3 A closed container is made by joining together a cylinder and a cone as shown in Diagram I. They have the same radius, 3 cm, and same height, 4 cm.

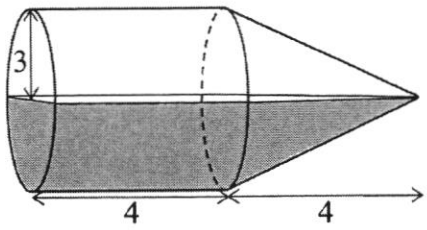


Diagram I

The container rests on a horizontal surface and is exactly half full of water.

(a) Calculate the surface area of the inside of the container that is in contact with the water. Leave your answer in terms of π.

Answer _____ cm^2 [4]

(b) Show that the volume of the water is 24π cm^3.

Answer [2]

(c) The container is held with its axis vertical, the cone being at the bottom, as shown in Diagram II.

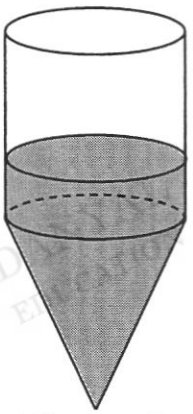
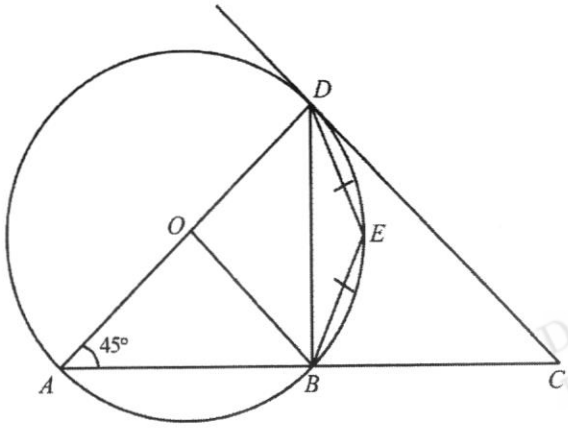


Diagram II

Calculate the depth of the water.

Answer _____ cm [3]

4 **(a)** In the figure below, O is the centre of the circle. Points A, B, E and D lie on the circumference of the circle. When produced, the tangent at point D meets the line AB at C. AOD is a straight line. OB is parallel to DC, $BE = DE$ and $\angle DAB = 45°$. The diagram is not drawn to scale.



(i) Find $\angle ACD$.

Answer _____° [1]

(ii) Calculate $\angle EBD$.

Answer _____° [1]

(iii) State reflex $\angle BOD$.

Answer _____° [1]

(iv) Prove that triangle AOB is similar to triangle ADC. State your reasons clearly.

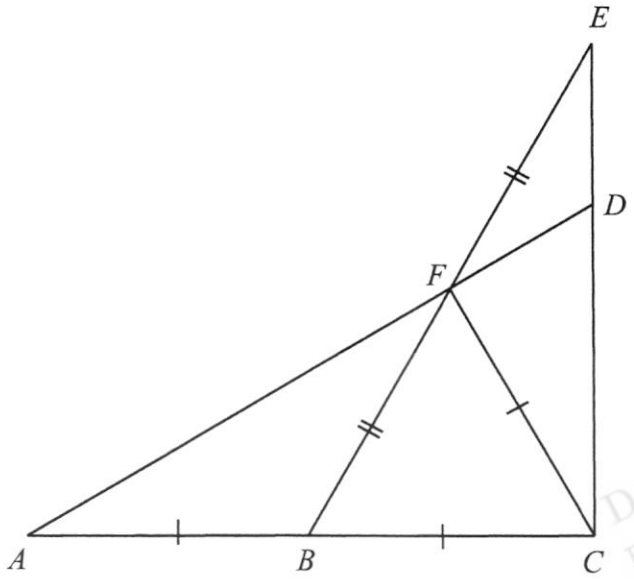
Answer

_____

_____

_____ [2]

(b) In the figure below, ABC, CDE and AFD are straight lines.



Given that $AB = BC = CF$ and $BF = FE$,

(i) prove that triangle ABF is congruent to triangle CFE,

Answer [3]

(ii) prove that triangle DEF is an isosceles triangle.

Answer [2]

5 Patrick planned a trip for his family to Australia for a vacation.
A month before the trip, he exchanged Singapore Dollars (S$) for Australian Dollar (AUD$) at an exchange rate of S$1 = AUD$ x.

(a) Write down an expression, in terms of x, for the amount of Singapore Dollars he exchanged if he received AUD$2000.

Answer S$_____ [1]

Just one week before the trip, the Australian Dollar weakened to a new exchange rate of S$1 = AUD$ $(x + 0.12)$. Patrick decided to exchange some Singapore Dollars to receive another AUD$2000.

(b) Write down an expression, in terms of x, for the amount of Singapore Dollars he exchanged for the second time.

Answer S$_____ [1]

(c) Given that he used S$200 lesser to receive AUD$2000 on the second exchange, form an equation in x and show that it reduces to $25x^2 + 3x - 30 = 0$.

Answer [3]

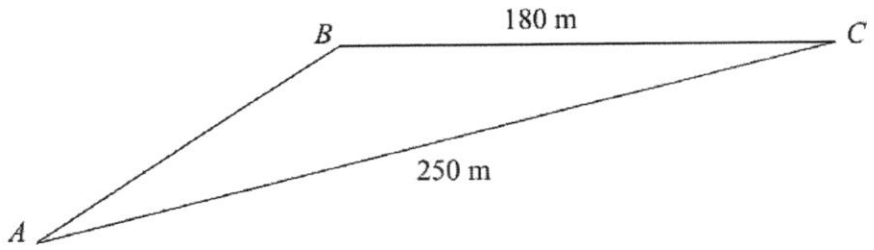
(d) Solve $25x^2 + 3x - 30 = 0$, giving your answers correct to 3 decimal places.

Answer $x =$ _____ or _____ [3]

(e) Find the total amount of Singapore Dollars that he exchanged in total, giving your answer correct to the nearest cent.

Answer S$ _____ [2]

6



Points A, B and C are located on a garden. AC is 250 m and BC is 180 m.
A is due south of C. The bearing of B from C is $205°$.

(a) Calculate AB.

Answer _____ m [3]

(b) Calculate the bearing of A from B.

Answer _____ ° [3]

(c) A tree is at point B.
A boy walks from A to C while looking at the top of the tree.
Calculate the distance travelled by him such that the angle of elevation is at its maximum.

Answer _____ m [2]

(d) Given that the height of the tree is 10 m, find the maximum angle of elevation.

Answer _____ ° [3]

7 The variables x and y are connected by the equation $y = \frac{x}{3} + \frac{2}{x} - 1$.

Some corresponding values of x and y are given in the table below.

x	0.3	0.5	1	2	3	4	5	6
y	5.77	p	1.33	0.67	0.67	0.83	1.07	1.33

(a) Find the value of p, correct to two decimal places.

Answer $p =$ _____ [1]

(b) On the given axes on the next page, plot the points given in the table and join them with a smooth curve for $0.3 \le x \le 6$. [3]

(c) By drawing a suitable line on your graph, find the solutions of the equation $\frac{x}{3} + \frac{2}{x} = 2$ in the range $0.3 \le x \le 6$.

Answer $x =$ _____ or _____ [2]

(d) By drawing a tangent, find the value of x where the gradient of the curve is approximately -2.5.

Answer $x =$ _____ [2]

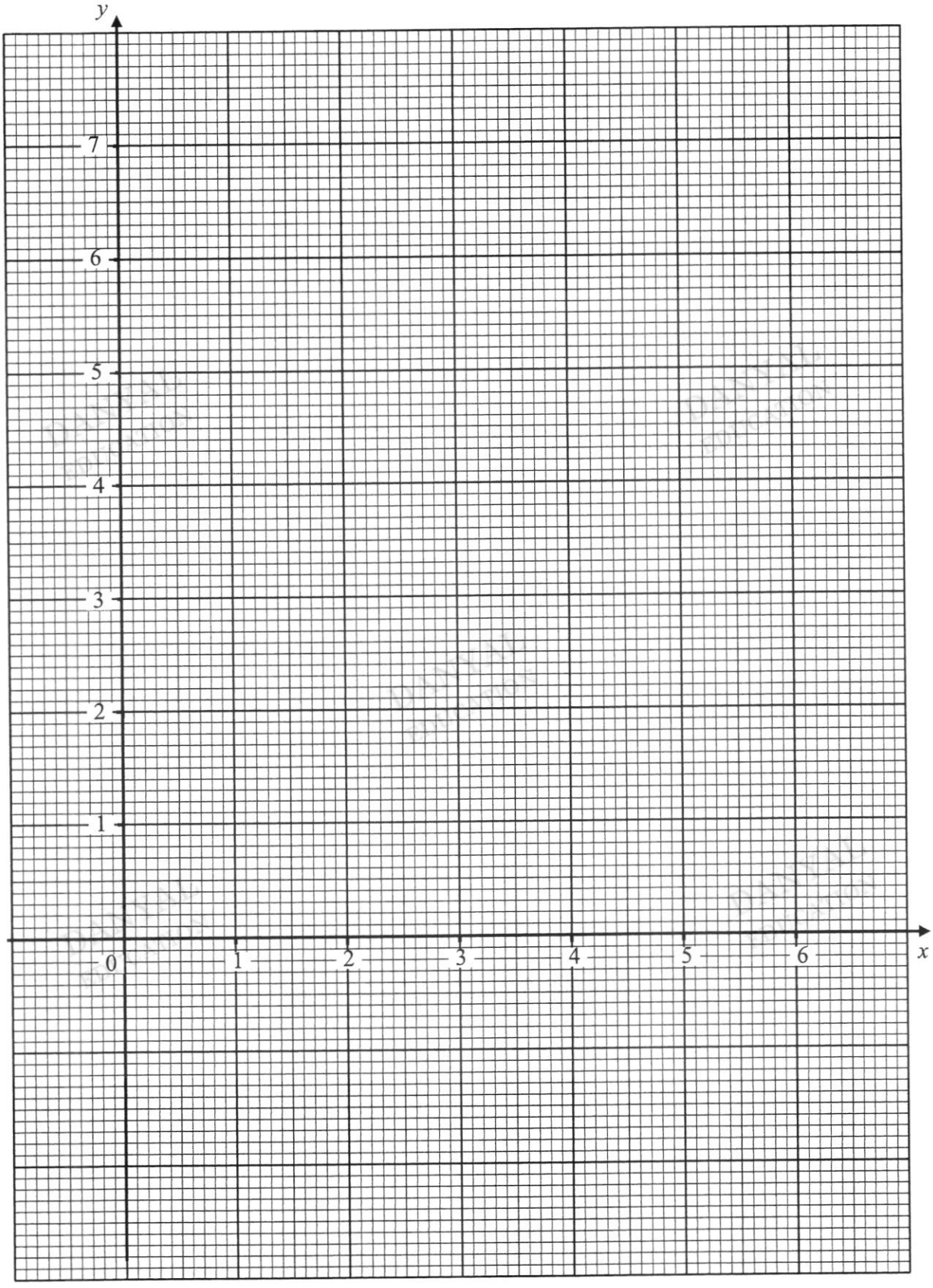
(e) **(i)** On the same grid in **(b)**, draw the line $y + x = 5$ for $0 \leq x \leq 6$.
Write down the x-coordinate of the two points where this line meets the curve.

Answer $x =$_____ and _____ [2]

(ii) These values of x are the solutions of the equation $Ax^2 - Bx + 3 = 0$.
Find the values of A and B.

Answer $A =$ _____

$B =$ _____ [3]


y
7
6
5
4
3
2
1
0
1
2
3
4
5
6
x

8 Amelia is a seller on an online shopping platform, ShopNow.

(a) She borrowed \$12 000 from a local bank with r% interest rate, compounded every year, to set up her online business in January 2018. She repaid the bank completely in January 2021, with an amount of of \$13267. Calculate r.

Answer $r =$_____ [3]

(b) ShopNow charges a commission fee of 5% for all the items that are sold through its platform, excluding 7% Goods and Services Tax (GST). In July, Amelia sold a total of \$3500 worth of electronic products. Calculate the total amount of commission fee inclusive of GST that she will need to pay to ShopNow.

Answer \$_____ [1]

(c) Amelia is launching a sale of a new electronic product in a month's time (30 days).

The table below shows the information on the costs that Amelia will incur with the launch of the sale of the new electronic product.

Production Cost of the product	$99 per set
Parcel Packaging Cost	$3.50 per set
Shipping Fee to buyer	$1.41 per set
Advertising Fees on ShopNow	$16 per day
Additional Fees charged by ShopNow	$392.10 per month
Office Rental Cost inclusive of utilities	$600 per month

After doing a market survey on the new electronic product, she estimates that she will be able to sell about 90 sets per month. She is targeting to earn a profit of between 20% and 30% of the total cost. There is currently one online seller who is selling a similar electronic product and it is priced at $150.

Suggest a sensible amount that Amelia should charge for each set of the new electronic product. Justify the decision you make and show your workings clearly.

Answer

[5]

End of Paper

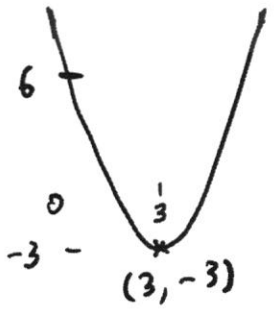
Anglo-Chinese School
(Barker Road)

Marking Scheme
Secondary 3 End-Of-Year Examination
SEC 3EXP 2021 P1

1	(a) (b)	-1.3620 -1.36			
2	(a) (b)	$2^2 \times 3^3 \times 11$ The power of the prime bases are not multiples of 3.			
3		$Y = \dfrac{k}{27x^3}$ $= \dfrac{1}{27}\left(\dfrac{k}{x^3}\right)$ $\dfrac{1}{27} \times 18 = \dfrac{2}{3}$			
4	(a) (b)	3 $y = 0.5^x$			
5		Let x be the original amount of revenue. $\dfrac{40}{100}x = 5000$ $x = 12500$			
6	(a) (b)	$\dfrac{2}{3}$ $-\dfrac{2}{3}$			
7	(a) (b)	$\dfrac{6}{17}$ $\dfrac{n}{3n-1}$			
8		The axis does not start from zero. It may cause people to think that the percentage of respondents who likes Xphone is three times more than the percentage of respondents who likes Starphone.			
9	(a) (b)	$-\dfrac{1}{2} < 3x - 4 \leq 8$ $-1 < 6x - 8 \leq 16$ $\dfrac{7}{6} < x \leq 4$  0 1			

Anglo-Chinese School
(Barker Road)

Marking Scheme
Secondary 3 End-Of-Year Examination
SEC 3EXP 2021 P1

		$\frac{1}{6}$ 2 3 4			
10	(a)	$3.93\times10^6-3.81\times10^6$ $=120000$ $=1.2\times10^5$			
	(b)	$\frac{9.54\times10^5-1.01\times10^6}{1.01\times10^6}\times100\%$ $=-5.5445$ $=-5.54\%(3sf)$			
11		$(n-2)\times180=125+120+140+155+135(n-4)$ $180n-360=540+135n-540$ $n=8$			
12	(a)	1:40000			
	(b)	$1cm^2:0.16km^2$ $8.5625cm^2$			
13	(a)	Construction			
	(b)	1 perpendicular bisector Point of intersection of 3 perpendicular bisectors			
14	(a)	$87.5g \le$ mass$<$88.5g			
	(b)	$\frac{88.5}{99.5}$ $=0.89944$ $=0.889g/cm^3(3sf)$			
15	(a)	$x-6x+\left(-\frac{6}{2}\right)^2+6-\left(-\frac{6}{2}\right)^2$ $(x-3)^2-3$			
	(b)				

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16 (a)	$10xy-12x+15y-18$ $=2x(5y-6)+3(5y-6)$ $=(2x+3)(5y-6)$			
(b)	xy^3-x^3y $=xy(y^2-x^2)$ $=xy(y-x)(y+x)$			
17 (a)	$9q^4r^{-4}$ $=\frac{9q^4}{r^4}$			
(b)	$7^k=7^{\frac{3}{2}}$ $k=\frac{3}{2}$			
18 (a)	$\frac{80}{360}\times 2\pi(1.6)$ $=2.23\text{m}$			
(b)	Let the intersection of AB and PC be X. $\cos 40°=\frac{PX}{1.6}$ $PX=1.6\cos 40°=1.22567$ Height of C above the ground $=0.5-(1.6-1.22567)$ $=0.126$ No the ball will not collide with the statue because the height of C above the ground is 0.126m, more than the height of the statue.			

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19		$\sqrt{x^2+y^2}=5$ $y=-\frac{4}{3}x$ $x^2+(-\frac{4}{3}x)^2=25$ $x^2=9$ $x=3$ or -3 $y=4$ $P(0,4)$			
20	(a)	The van was travelling at constant speed of 18 m/s.			
	(b)	$\frac{x}{18-14.5}=\frac{18}{4}$ $x=15.75$			
	(c)	$\frac{234}{18}=13\text{m/s}$			

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1	(a)	$\frac{3}{2x-5}-\frac{1}{5+x}$ $=\frac{3(5+x)-1(2x-5)}{(2x-5)(5+x)}$ $=\frac{20+x}{(2x-5)(5+x)}$			
	(b)	$=\frac{5a^2b^2c}{2a^3}\times\frac{-9c}{8b^3}$ $=\frac{-45c^2}{16ab}$			
	(c)(i)	$\frac{9}{11}$			
	(ii)	$A=\frac{3}{2}\left(\frac{p^2-q^2}{r}\right)$ $\frac{2Ar}{3}=p^2-q^2$ $q^2=p^2-\frac{2Ar}{3}$ $q=\pm\sqrt{p^2-\frac{2Ar}{3}}$			
2	(a)(i)	$\frac{737}{27}$ $=27.296$ $=27.3(3sf)$			
	(ii)	28			
	(iii)	32			
	(b)	$\frac{11}{27}\times100\%$ $=40.7\%(3sf)$			
	(c)	Mathematics because the median mark is 28 marks which is higher than the median mark for Science weighted assessment which is 26 marks. (or comparison of mean: Math (27.3) Science (26.1)).			

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	(d)	$\frac{11}{27}$			
	(e)	The mean will increase by 2 marks. Range will remain the same.			
3	(a)	Slanted height of cone = 5 cm Total surface area $=\pi(3)^2+2\pi(3)(4)+\pi(3)(5)$ $=48\pi$ Surface area in contact with water $=24\pi$			
	(b)	Volume of cylinder $=\pi(3)^2(4)=36\pi$ Volume of cone $=\frac{1}{3}\pi(3)^2(4)=12\pi$ Volume of water $=\frac{1}{2}(36\pi+12\pi)=24\pi$			
	(c)	Volume of water in cylinder $=24\pi-12\pi=12\pi$ Height of water in cylinder $=12\pi\div\pi(3)^2=\frac{4}{3}$ cm Depth of the water $=\frac{4}{3}+4=5.33$ cm OR Ratio of volume of cylinder: cone = 3:1 Volume of container → 4 units Volume of water → 2 units Volume of water in container → 1 unit Height of water in cylinder $=\frac{1}{3}\times 4$ cm			

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		Depth of the water $=\frac{4}{3}+4=5.33\,\text{cm}$			
4	(a)(i)	$\angle ADC=90°$(tangent $\perp$ radius) $\angle ACD=180°-90°-45°$ $=45°$			
	(ii)	$\angle BED=180°-45°=135°$ $\angle EBD=\frac{180°-135°}{2}$ $=22.5°$			
	(iii)	Reflex $\angle BOD=2\times135°$ $=270°$			
	(iv)	$\angle DAC=\angle OAB$(given) $\angle AOB=\angle ADC$(corr $\angle s, OB//DC$) AOB is similar to ADC(AA similarity test)			
	(b)(i)	$AB=CF$ and $BF=FE$			
		Let $\angle FBC=\angle BFC=x$ (isosceles triangle)			
		$\angle ABF=\angle CFE=180°-x$ (adj. $\angle$ on a st. line)			
		$\Delta ABF\equiv\Delta CFE$ (SAS)			
	(ii)	Because $\Delta ABF\equiv\Delta CFE$, $\angle AFB=\angle CEF$			
		$\angle AFB=\angle EFD$ (vertically opposite angles)			
		$\therefore\angle DEF=\angle EFD$, DEF is an isosceles triangle.			
5	(a)	$\frac{2000}{x}$			
	(b)	$\frac{2000}{x+0.12}$ or $\frac{50000}{25x+3}$ or $\frac{200000}{100x+12}$			
	(c)				

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	(d)	$\frac{2000}{x}-\frac{2000}{x+0.12}=200$ $2000(x+0.12)-2000x=200x(x+0.12)$ $200x^2+24x-240=0$ $25x^2+3x-30=0$ $x=\frac{-(3)\pm\sqrt{(3)^2-4(25)(-30)}}{2(25)}$ $x=1.0370$ or -1.15708 $=1.037$ or $-1.157(3dp)$			
	(e)	$\frac{2000}{1.037}+\frac{2000}{1.037+0.12}$ $=3657.248$ $=3657.25(2dp)$			
6	(a)	$\angle BCA=205°-180°=25°$			
		$AB^2=180^2+250^2-2(180)(250)\cos 25°$			
		$AB=\sqrt{13332.29917}$			
		= 115.466 m (6 s.f.) = 115 m (3 s.f.)			
	(b)	$\frac{\sin\angle ABC}{250}=\frac{\sin 25°}{115.466}$			
		$\sin\angle ABC=\frac{\sin 25°}{115.466}\times 250$			
		$\angle ABC=180-66.210°=113.79°$ (2 d.p.)			
		OR			
		$\frac{\sin\angle BAC}{180}=\frac{\sin 25°}{115.466}$ $\angle ABC=180-25-41.2099=113.8°$ or simply find Bearing $=180-41.2099$			
		OR $\cos\angle ABC=\frac{180^2+115.466^2-250^2}{2(180)(115.466)}$			
		Bearing of A from B			
		$=25°+113.79°$ $=138.8°$ (1 d.p.)			

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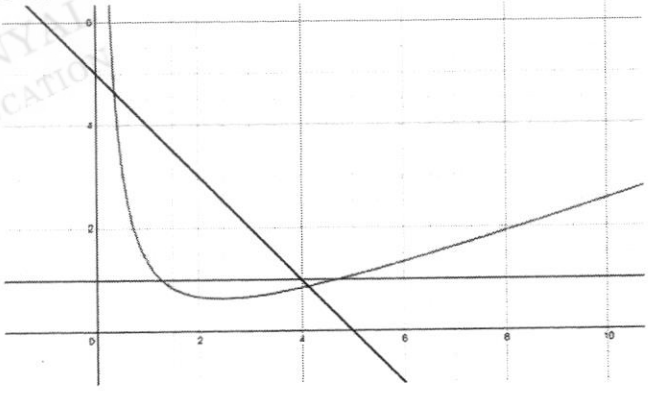
(c)	Let BX be the shortest distance from B to AC.			
	$\cos 25° = \frac{CX}{180}$			
	$CX = 180 \times \cos 25°$			
	$= 163.135$ m			
	Distance travelled			
	$= 250 - 163.135$			
	$= 86.865$ m (5 s.f.) $= 86.9$ m (3sf)			
	OR			
	$\cos 41.2099° = \frac{AX}{115.466}$			
	$AX = 86.9$ m			
(d)	$BX = 76.0707$			
	$\tan\theta = \frac{10}{76.0707}$			
	$\theta = 7.4889$ $= 7.5°(1dp)$			
7 (a)	3.17			
(b)				
(c)	$y = 1$ drawn $x = 1.25$ or 4.75			
(d)	Tangent of gradient -2.5 drawn $x = 0.85$			

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(e)(i) $y+x=5$ drawn

$x=0.35$ or 4.15

(ii) $5-x=\frac{x}{3}+\frac{2}{x}-1$

$2x^2-9x+3=0$

$A=2$

$B=9$

8 (a) $12000\left(1+\frac{r}{100}\right)^3=13267$

$\left(1+\frac{r}{100}\right)^3=\frac{13267}{12000}$

$1+\frac{r}{100}=\sqrt[3]{\frac{13267}{12000}}$

$r=3.4023$

$r=3.40(3sf)$

(b) $\frac{5}{100}\times 3500=175$

$\frac{107}{100}\times 175$

$=187.25$

(c) **Total Costs incurred by Amelia**

Production Cost of the product	\$99 per set	99×90 $=8910$
Parcel Packaging Cost	\$3.50 per set	3.50×90 $=315$
Shipping Fee to buyer	\$1.41 per set	1.41×90 $=126.90$
Advertising Fees on ShopNow	\$16 per day	16×30 $=480$

Additional Fees charged by ShopNow	$392.10 per month	392.10
Office Rental Cost inclusive of utilities	$600 per month	600
Total cost per product		$10824

If she earns 30% profit,
1.3×10824
$= 14071.20$
Suggested Price per set
$= \frac{14071.20}{90}$
$= \$156.35(2dp)$

If she earns 20% profit,
1.2×10824
$= 12988.80$
Suggested Price per set
$= \frac{12988.80}{90}$
$= \$144.32(2dp)$

Amelia should price the product at $145 as it is cheaper than what the other online seller is charging at $150.

OR

Amelia should price the product at $156.35 so that she can earn the highest percentage of profit from her sales. (This answer is acceptable as the advertising fees is significant in real context to channel more visitor traffic to buy the product from her or it could be a case whereby the other online seller may run out of stocks or her regular

	customers do not mind paying more for her good service) OR Amelia should price the product at $150 similar to what the other online seller is charging since they are the only two sellers online.			