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ST. PATRICK'S SCHOOL
MID-YEAR EXAMINATIONS 2018
SECONDARY THREE EXPRESS

NAME

CLASS

INDEX
NUMBER

MATHEMATICS
PAPER 1

4048/01
7 May 2018
2 h

READ THESE INSTRUCTIONS FIRST

Write your Name, Class and Index Number on all the work you hand in.

Write in dark blue or black pen.

You may use a pencil for any diagrams or graphs.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

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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 number of marks for this paper is 80.

Parent's Signature : _____

Date: _____

Remarks (if any) :

<i>For Examiner's Use</i>	
Paper 1	/80
Paper 2	/60
Target Grade	
Total	%

This paper consists of 20 printed pages including this cover page.

Mathematical Formulae*Compound interest*

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

Mensuration

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

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

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

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1 (i) (a) Calculate $\frac{4.05}{\sqrt{0.045 \times 5.2913}}$.

Write down the first 5 digits of your answer.

Answer [1]

(b) Write your answer to part (i) correct to 3 significant figures.

Answer [1]

(ii) Write the following in order of size, smallest first.

$$\frac{36}{70}$$

$$\sqrt{0.25}$$

$$0.\dot{5}$$

$$0.0915^{\frac{1}{4}}$$

Answer [2]

2 Petrol costs p cents per litre.

Jake paid y dollars for some petrol.

Find an expression, in terms of p and y , for the number of litres that Jake buys.

Answer [2]

- 3 (i) Simplify $\left(\frac{7}{x}\right)^{-3}$.

Answer [1]

- (ii) Given that $5^{12} \div 125^k = 1$, find the value of k .

Answer $k =$ [2]

- 4 An atom of nitrogen has a mass of 2.3×10^{-26} kilograms. Leave your answer in standard form.

- (i) Express this mass in grams.

Answerg [1]

- (ii) A room contains 9.5×10^{15} atoms of Nitrogen. Find the mass of Nitrogen in grams in the room.

Answerg [2]

5 Given that $-8 \leq x < 4$ and $-2 \leq y < 3$, find

(i) the greatest value of $x - y$,

Answer [1]

(ii) the least value of $2x + y^2$,

Answer [1]

(iii) the greatest value of xy .

Answer [1]

6

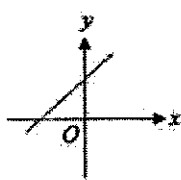


Figure 1

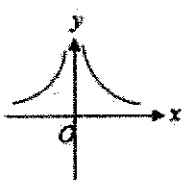


Figure 2

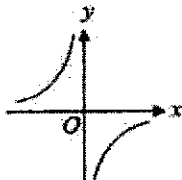


Figure 3

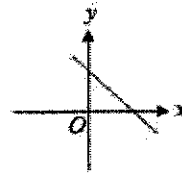


Figure 4

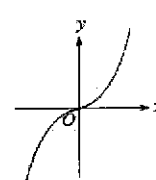


Figure 5

Write down the figure number of the graph that corresponds to the following equations.

(i) $y = 2x^3$

Answer Figure..... [1]

(ii) $y = \frac{1}{x^2}$

Answer Figure..... [1]

(iii) $y = x + 3$

Answer Figure..... [1]

7 A map of a town is drawn to a scale of 1 : 20 000.

- (i) A stretch of street on the map measures 16.2 cm. Calculate the actual length of the street in kilometres.

Answer km [1]

- (ii) A library has an area of 0.5 km². Find the area of this library on the map in cm².

Answer cm² [2]

8 Solve the simultaneous equations

$$2x + 5y = 12$$

$$4x + 3y = -4$$

Answer $x = \dots\dots\dots$, $y = \dots\dots\dots$ [3]

- 9 (i) Express 525 as the product of its prime factors.

Answer 525=..... [1]

- (ii) Given that $297 = 3^3 \times 11$, find the LCM of 525 and 297.

Answer [1]

- (iii) If $525k$ is a perfect square, find the smallest possible integer value of k .

Answer $k =$ [1]

- 10 (i) Express 30 km/h in m/s.

Answer m/s [1]

- (ii) A car travels the first 18 km of its journey at an average speed of 54 km/h and the remaining 55 km at an average speed of 110 km/h. Find the average speed of the car for its entire journey.

Answerkm/h [3]

- 11** (i) James bought a watch for \$500.
Several years later, he sold it at a profit of 250%.
Find the selling price.

Answer \$..... [2]

- (ii) \$4000 is invested in an account which pays interest at 5.5% per annum compounded yearly. Find the total amount in the account at the end of 3 years.

Answer \$..... [2]

- 12 (i) Solve the inequality $3x - 1 < 9 - 4x \leq 27$.

Answer [3]

- (ii) Show your solution on the number line below.

Answer

_____ → [1]

- 13 (i) y is inversely proportional to x^2 .

$$y = 4 \text{ when } x = 6.$$

Find y when $x = 10$.

Answer [2]

- (ii) p is directly proportional to q^3 .

It is known that $p = 24$ for a particular value of q .

Find the value of p when this value of q is doubled.

Answer $p =$ [2]

- 14 (i) Simplify $(x+5)^2 - 2(1+x)$.

Answer [2]

- (ii) Factorise $pq^2 - q^2 + p - 1$ completely.

Answer [2]

- 15** James bought a drone under a hire purchase scheme with a monthly instalment of \$130 for 24 months and a down payment of 12.5% of the cash price. If the cash price of the drone set is \$3450, find

(i) the interest charged by the hire purchase scheme,

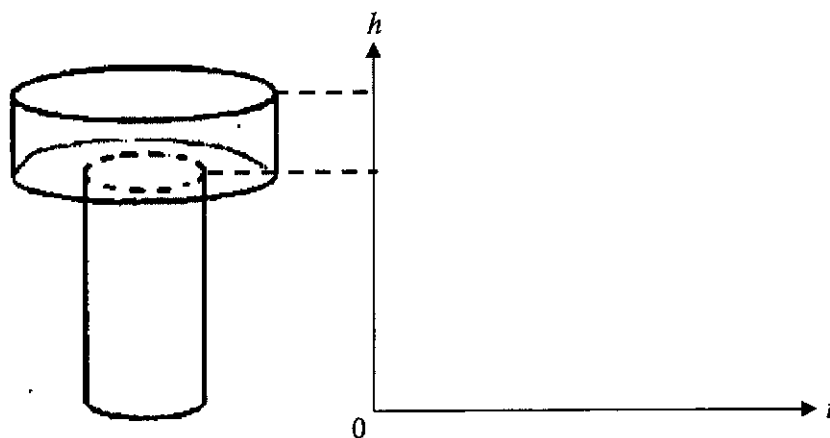
Answer \$..... [2]

(ii) the rate of interest charged per annum by the hire purchase scheme.

Answer% [2]

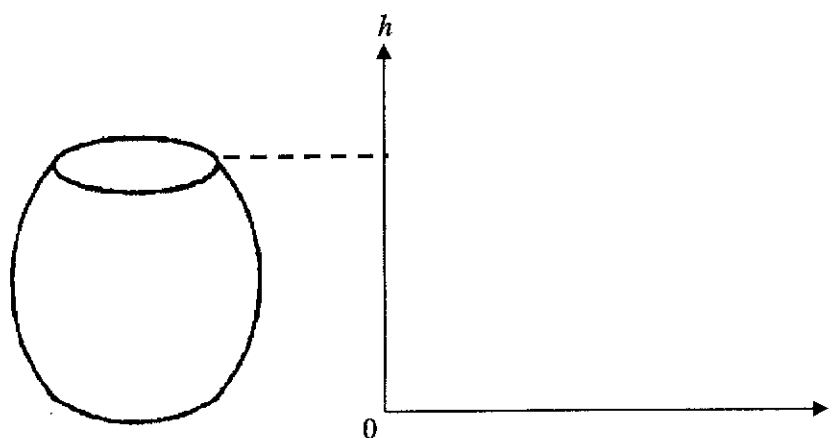
- 16 Water is poured at a constant rate into each of the containers shown below. In the diagram below, sketch the graphs to show the depth of water h in the containers as they are being filled with respect to time t .

(i)



[2]

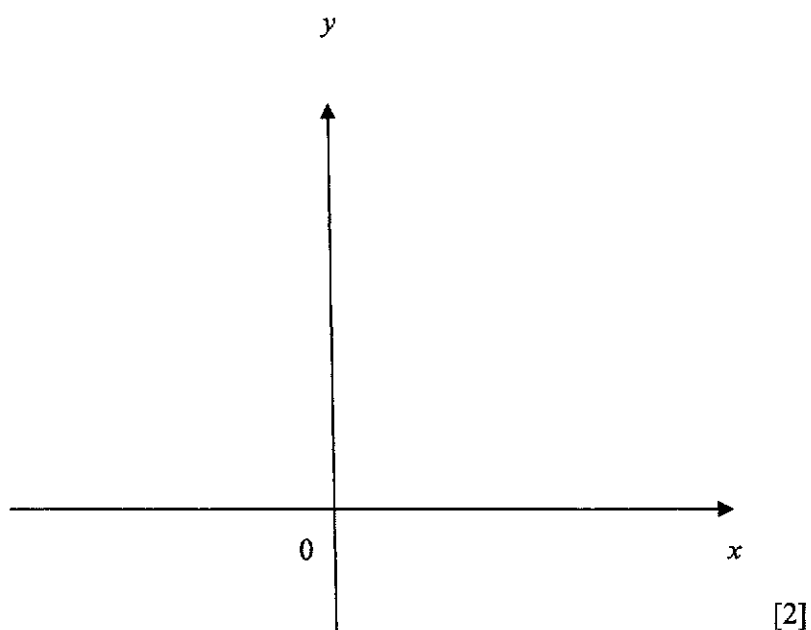
(ii)



[2]

- 17 (i) Sketch the graph of $y = (x - 2)^2 + 3$.

Answer (i)



- (ii) Write down the coordinates of the minimum point of the curve.

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

- (iii) Write down the equation of the line of symmetry.

Answer [1]

18 Simplify

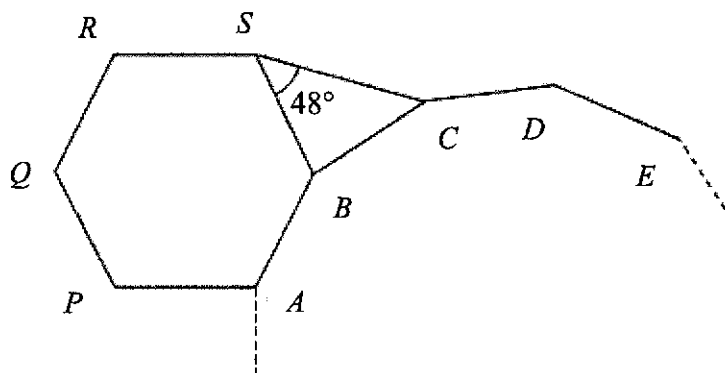
(i) $\frac{(2xy^3)^2}{\sqrt{x^2y^4}}$, leaving your answer in positive indices,

Answer [3]

(ii) $\frac{3x}{(x-3)^2} + \frac{1}{x-3}$.

Answer [2]

- 19 In the diagram below which is not drawn to scale, $ABCDE$ is part of an n -sided regular polygon, $PQRSBA$ is a regular hexagon, CBS is an isosceles triangle and $\angle BSC = 48^\circ$.



By stating your reason(s) clearly, find

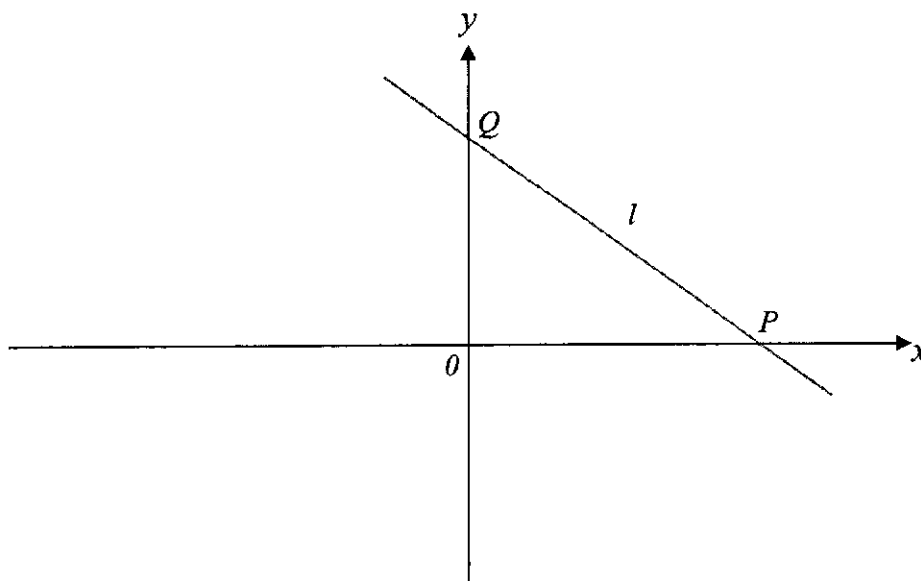
- (i) $\angle ABC$,

Answer $^\circ$ [3]

- (ii) the value of n .

Answer $n =$ [2]

- 20 The equation $2y + 8x = 18$ is a straight line l that crosses the x -axis at P and the y -axis at Q . Find



- (i) the coordinates of the points P and Q ,

Answer P (.....,)

Q (.....,) [2]

- (ii) the gradient of the line l ,

Answer [1]

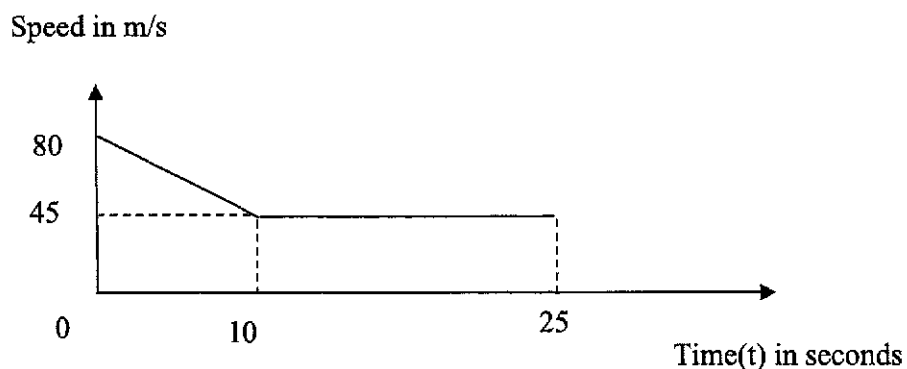
- (iii) the length of PQ ,

Answer units [1]

- (iv) the equation of a line which passes through the point $(0, -2)$ and is parallel to the line l .

Answer [1]

- 21 The diagram is the speed-time graph of an object during a period of 25 seconds.



- (i) Calculate the retardation during the first 10 seconds.

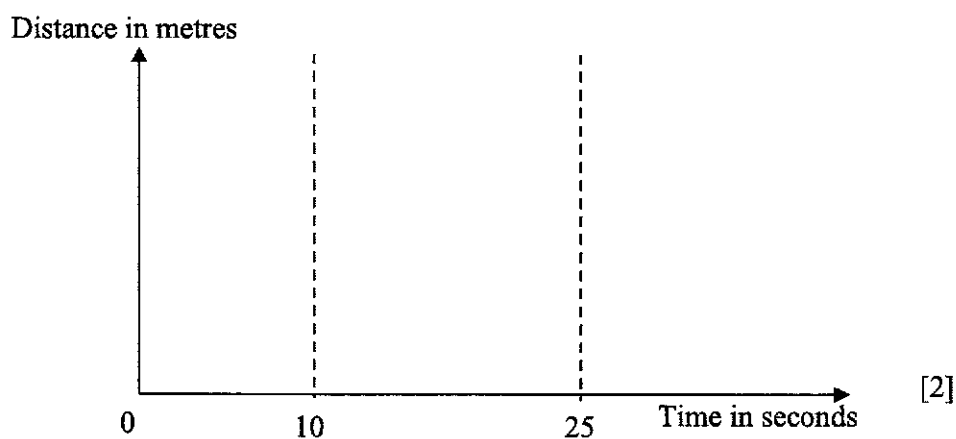
Answerm/s² [2]

- (ii) Find the distance travelled by the object in the first 10 seconds.

Answerm/s [2]

- (iii) On the axes in the answer space, complete the sketch of the distance-time graph for the object.

Answer



End of paper



ST. PATRICK'S SCHOOL
MID-YEAR EXAMINATIONS 2018
SECONDARY THREE EXPRESS

NAME

CLASS

INDEX
NUMBER

MATHEMATICS
PAPER 2

4048/02
10 May 2018
2 h

READ THESE INSTRUCTIONS FIRST

Write your Name, Class and Index Number on all the work you hand in.

Write in dark blue or black pen.

You may use a pencil for any diagrams or graphs.

Answer **all** questions.

Write your answers on the separate answer paper provided.

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At the end of the examination, fasten 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 60.

Question papers are to be submitted.

This paper consists of 7 printed pages including this cover page.

PartnerInLearning

138

Mathematical Formulae*Compound interest*

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Mensuration

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

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Statistics

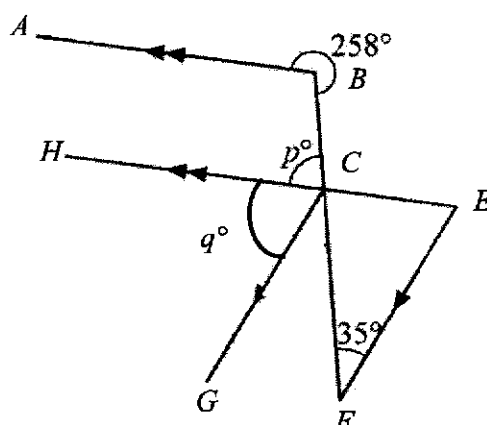
$$\text{Mean} = \frac{\sum fx}{\sum f}$$

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

Answer all questions.

- 1 (i) Given that $x = \sqrt{5y+1}$, express y in terms of x . [2]
- (ii) Solve the inequality $\frac{3x+1}{7} \leq \frac{5x-6}{4}$. [3]
- (iii) Solve the equation $3 - \frac{x+1}{3-x} = 0$. [2]
- (iv) Simplify $\frac{m^2-4}{(m-2)(m+3)}$. [2]
-

- 2 In the diagram below, $AB \parallel HE$, $GC \parallel FE$, reflex $\angle ABC = 258^\circ$, $\angle CFE = 35^\circ$ and BCF is a straight line.



Stating your reasons clearly, find the values of

- (i) p . [2]
- (ii) q . [2]
-

- 3 The points $A(20, 10)$ and $B(14, 0)$ lie on a coordinate plane.

- (i) Find the equation of the line AB . [3]
- (ii) Given that the point $W(9, p)$ lies on the line AB , find the value of p . [1]
-

- 4 The first four terms in a sequence of numbers T_1 , T_2 , T_3 and T_4 are given below.

$$T_1 = 4 - 3 = 1$$

$$T_2 = 9 - 6 = 3$$

$$T_3 = 16 - 9 = 7$$

$$T_4 = 25 - 12 = 13$$

- (i) Study the pattern and write down the line for T_5 . [1]
 - (ii) T_n can be expressed in the form $an^2 + bn + c$, where a , b and c are constants. Find the values of a , b and c . [2]
 - (iii) Find k such that $T_k = 73$ where $k > 0$. [2]
-

- 5
- (i) A consignment of cattle feed can feed 600 cattle for 30 days. Given that all the cattle consume the feed at the same rate, find
 - (a) The number of cattle the same consignment of feed can feed for 80 days. [2]
 - (b) The number of days the same consignment of feed can last if it is used for 400 cattle. [1]
 - (ii) Bloom invested a sum of money in a bank at 6 % per annum compounded every 6 months. She received an interest of \$11798.38 at the end of 3 years. Calculate the sum of money invested, giving your answer correct to the nearest dollar. [3]
 - (iii) Kane went to London for a holiday in 2017.
 - (a) He exchanged some Singapore dollars (S\$) for British Pounds (£) from a money changer at an exchange rate of S\$1.83 = £1. Calculate the amount of Singapore dollars he had to pay to buy £5000. [1]
 - (b) He bought a bag in London for £650. Upon his return to Singapore, he sold the bag on Carousell and made a profit of 15%. Find the selling price of the bag in Singapore dollars. [2]
-

- 6 Mr Tan made a 240 km journey by car from point A to B at an average speed of v km/h.

(i) Write down an expression in terms of v , for the number of hours taken for the journey. [1]

On his return journey, his average speed was reduced by 10 km/h due to slow traffic.

(ii) Write down an expression in terms of v , for the number of hours taken for the return journey. [1]

(iii) If the return journey takes 20 minutes longer, form an equation in v and show that it reduces to $v^2 - 10v - 7200 = 0$. [3]

(iv) Solve the equation $v^2 - 10v - 7200 = 0$. [3]

(v) Using your answer in (iv), find the time taken for his entire journey. [1]

7 Answer the whole of this question on a sheet of graph paper.

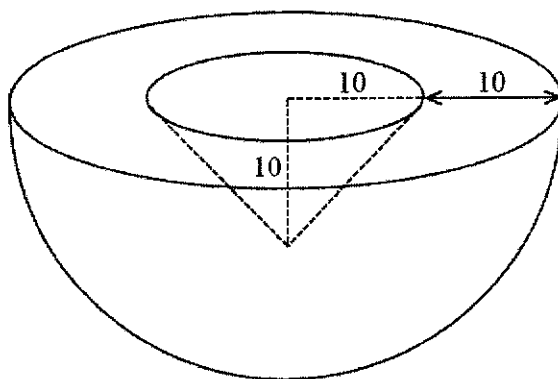
The following table gives corresponding values of x and y which

are connected by the equation $y = \frac{x^2}{5} + \frac{5}{x}$.

x	1	1.5	2	3	4	5	6
y	5.2	p	3.3	3.5	4.5	6.0	8.0

- (i) Calculate the value of p , leaving your answer to 1 decimal place. [1]
- (ii) Using a scale of 2 cm to present 1 unit on both axes, draw the graph of $y = \frac{x^2}{5} + \frac{5}{x}$ for $0 \leq x \leq 6$. [3]
- (iii) Use your graph to find the values of x for which $\frac{x^2}{5} + \frac{5}{x} = 4$. [2]
- (iv) By drawing a tangent, find the gradient of the curve at the point (4,4.5). [2]
- (v) (a) On the same axes, draw the graph of $y = \frac{1}{2}x + 3$. [1]
- (b) Write down the x coordinates of the points at which the two graphs intersect. [1]
-

- 8 The diagram shows an object in the shape of a hemisphere of radius 20 cm. The object has a conical hole of radius 10 cm and height 10 cm, at the centre of the hemisphere as shown.



- (i) Find
- (a) the volume of the object, [3]
- (b) the total surface area of the object. [4]
- (ii) The object must not have a mass greater than 80 kg. Two types of metal are available and the table below shows their densities. ($Mass = Density \times Volume$)

Metal	Aluminum	Copper
Density (g/cm^3)	2.70	8.96

Which of these metals should be used to manufacture the object? Show your working. [3]

End of Paper



ST. PATRICK'S SCHOOL
MID-YEAR EXAMINATIONS 2018
SECONDARY THREE EXPRESS

NAME

SOLUTIONS

CLASS

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MATHEMATICS
PAPER 1

4048/01
7 May 2018
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Total	%

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1 (i) (a) Calculate $\frac{4.05}{\sqrt{0.045 \times 5.2913}}$.

Write down the first 5 digits of your answer.

Answer8.2997..... [1]

(b) Write your answer to part (i) correct to 3 significant figures.

Answer8.30..... [1]

(ii) Write the following in order of size, smallest first.

$$\frac{36}{70}$$

$$\sqrt{0.25}$$

$$0.\dot{5}$$

$$0.0915^{\frac{1}{4}}$$

Answer $\sqrt{0.25}$, $\frac{36}{70}$, $0.0915^{\frac{1}{4}}$, $0.\dot{5}$ [2]

2 Petrol costs p cents per litre.

Jake paid y dollars for some petrol.

Find an expression, in terms of p and y , for the number of litres that Jake buys.

Y dollars = 100y cents -----M1

No. of litres. = $\frac{100y}{p}$ -----A1

[2]

Answer

- 3 (i) Simplify $\left(\frac{7}{x}\right)^{-3}$.

Answer $\left(\frac{x^3}{343}\right)$ [1]

- (ii) Given that $5^{12} \div 125^k = 1$, find the value of k .

$$5^{12} \div 125^k = 1$$

$$5^{12} \div 5^{3k} = 5^0 \text{ -----M1}$$

$$12 - 3k = 0$$

$$3k = 12$$

$$k = 4 \text{ -----A1}$$

Answer $k =$ [2]

- 4 An atom of nitrogen has a mass of 2.3×10^{-26} kilograms. Leave your answer in standard form.

- (i) Express this mass in grams.

Answer 2.3×10^{-23} g [1]

- (ii) A room contains 9.5×10^{15} atoms of Nitrogen. Find the mass of Nitrogen in grams in the room.

$$= 9.5 \times 10^{15} \times 2.3 \times 10^{-23} \text{ -----M1}$$

$$= 2.185 \times 10^{-7} \text{ -----A1}$$

Answer g [2]

5 Given that $-8 \leq x < 4$ and $-2 \leq y < 3$, find

(i) the greatest value of $x - y$,

$$3 - (-2) = 5 \text{ -----B1}$$

Answer [1]

(ii) the least value of $2x + y^2$,

$$2(-8) + 0^2 = -16 \text{ -----B1}$$

Answer [1]

(iii) the greatest value of xy .

$$-8(-2) = 16 \text{ -----B1}$$

Answer [1]

6

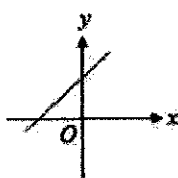


Figure 1

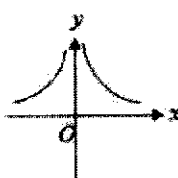


Figure 2

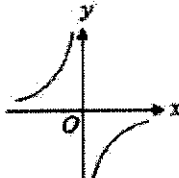


Figure 3

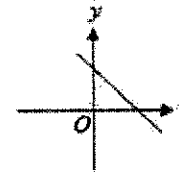


Figure 4

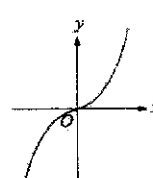


Figure 5

Write down the figure number of the graph that corresponds to the following equations.

(i) $y = 2x^3$

Answer Figure.....5..... [1]

(ii) $y = \frac{1}{x^2}$

Answer Figure.....2..... [1]

(iii) $y = x + 3$

Answer Figure.....1..... [1]

7 A map of a town is drawn to a scale of 1 : 20 000.

- (i) A stretch of street on the map measures 16.2 cm. Calculate the actual length of the street in kilometres.

$$1 : 0.2 \text{ km}$$

$$16.2 \text{ cm} : 3.24 \text{ km} \text{-----B1}$$

[1]

Answer km

- (ii) A library has an area of 0.5 km². Find the area of this library on the map in cm².

$$1 \text{ cm}^2 : 0.04 \text{ km}^2 \text{-----M1}$$

$$\begin{aligned} \text{Map area} &= \frac{0.5}{0.04} \\ &= 12.5 \text{ cm}^2 \text{-----A1} \end{aligned}$$

[2]

Answer cm²

8 Solve the simultaneous equations

$$2x + 5y = 12$$

$$4x + 3y = -4$$

$$(1) \times 2 : 4x + 10y = 24 \text{ -----M1}$$

$$(2) -(3) : -7y = -28$$

$$y = 4 \text{ -----A1}$$

Sub $y=4$ into (1):

$$2x + 5(4) = 12$$

$$2x = -8$$

$$x = -4 \text{ -----A1}$$

Answer $x =$, $y =$ [3]

- 9 (i) Express 525 as the product of its prime factors.

Answer $525 = \dots 3 \times 5^2 \times 7 \dots\dots\dots$ [1]

- (ii) Given that $297 = 3^3 \times 11$, find the LCM of 525 and 297.

$$3^3 \times 5^2 \times 7 \times 11 = 51975$$

Answer [1]

- (iii) If $525k$ is a perfect square, find the smallest possible integer value of k .

Answer $k = \dots\dots\dots 21 \dots\dots\dots$ [1]

- 10 (i) Express 30 km/h in m/s.

Answer $8\frac{1}{3}$ m/s [1]

- (ii) A car travels the first 18 km of its journey at an average speed of 54 km/h and the remaining 55 km at an average speed of 110 km/h. Find the average speed of the car for its entire journey.

$$\begin{aligned}\text{Total time} &= \frac{18}{54} + \frac{55}{110} \\ &= \frac{5}{6} \text{-----M1}\end{aligned}$$

$$\text{Average speed} = \frac{18+55}{\frac{5}{6}} \text{-----M1}$$

$$= 87\frac{3}{5} \text{-----A1}$$

[3]

Answer km/h

- 11 (i) James bought a watch for \$500.
Several years later, he sold it at a profit of 250%.
Find the selling price.

$$\begin{aligned}\text{Selling price} &= \frac{350}{100} \times 500 \text{-----M1} \\ &= \$1750 \text{-----A1}\end{aligned}$$

Answer \$..... [2]

- (ii) \$4000 is invested in an account which pays interest at 5.5% per annum compounded yearly. Find the total amount in the account at the end of 3 years.

$$A = 4000 \left(1 + \frac{5.5}{100} \right)^3 \text{-----M1}$$

$$A = 4696.9655$$

$$A = 4696.97 \text{-----A1}$$

Answer \$..... [2]

- 12 (i) Solve the inequality $3x - 1 < 9 - 4x \leq 27$.

$$3x - 1 < 9 - 4x$$

$$7x < 10$$

$$x < \frac{10}{7} \text{-----M1}$$

$$9 - 4x \leq 27$$

$$-4x \leq 18$$

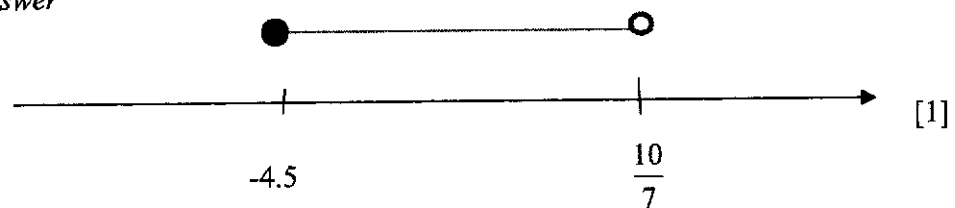
$$x \geq -4.5 \text{-----M1}$$

$$\therefore -4.5 \leq x < \frac{10}{7} \text{-----A1}$$

Answer [3]

- (ii) Show your solution on the number line below.

Answer



- 13 (i) y is inversely proportional to x^2 .

$$y = 4 \text{ when } x = 6.$$

Find y when $x = 10$.

$$y = \frac{k}{x^2}$$

$$4 = \frac{k}{6^2}$$

$$k = 144 \text{ -----M1}$$

$$y = \frac{144}{x^2}$$

$$y = \frac{144}{100} = 1.44 \text{ -----A1}$$

[2]

Answer

- (ii) p is directly proportional to q^3 .

It is known that $p = 24$ for a particular value of q .

Find the value of p when this value of q is doubled.

$$p = kq^3$$

$$24 = kq^3$$

$$k = \frac{24}{q^3} \text{ -----m1}$$

$$p_{\text{new}} = \frac{24}{q^3} (2q)^3$$

$$P_{\text{new}} = \frac{24}{q^3} \times 8q^3 = 192 \text{ -----A1}$$

Answer $p = \dots\dots\dots$ [2]

- 14 (i) Simplify $(x+5)^2 - 2(1+x)$.

$$= x^2 + 10x + 25 - 2 - 2x \text{-----M1}$$

$$= x^2 + 8x + 23 \text{-----A1}$$

Answer [2]

- (ii) Factorise $pq^2 - q^2 + p - 1$ completely.

$$= q^2(p-1) + (p-1) \text{-----M1}$$

$$= (q^2 + 1)(p-1) \text{-----A1}$$

Answer [2]

- 15 James bought a drone under a hire purchase scheme with a monthly instalment of \$130 for 24 months and a down payment of 12.5% of the cash price. If the cash price of the drone set is \$3450, find

(i) the interest charged by the hire purchase scheme,

$$\begin{aligned}\text{total paid} &= \frac{12.5}{100} \times 3450 + 130 \times 24 \\ &= \$3551.25 \text{ -----M1} \\ \text{Interest} &= 3551.25 - 3450 \\ &= \$101.25 \text{ -----A1}\end{aligned}$$

Answer \$..... [2]

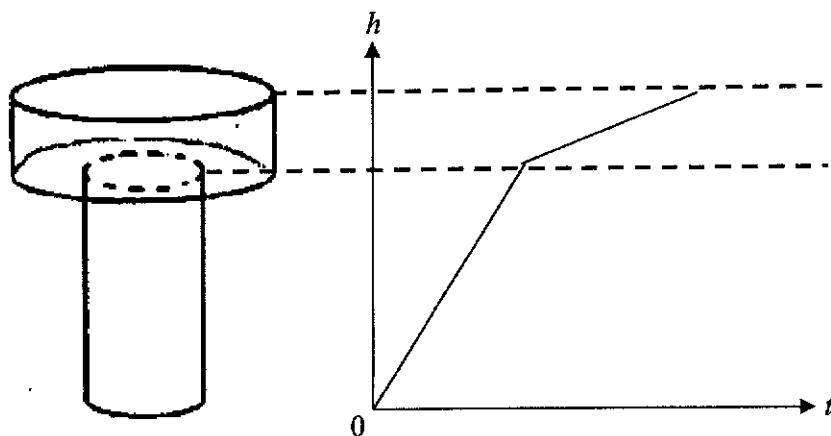
(ii) the rate of interest charged per annum by the hire purchase scheme.

$$\begin{aligned}I &= \frac{PRT}{100} \\ 101.25 &= \frac{\frac{87.5}{100} \times 3450 \times R \times 2}{100} \text{ -----M1} \\ R &= 1.677 \\ &= 1.68\% \text{ -----A1}\end{aligned}$$

Answer% [2]

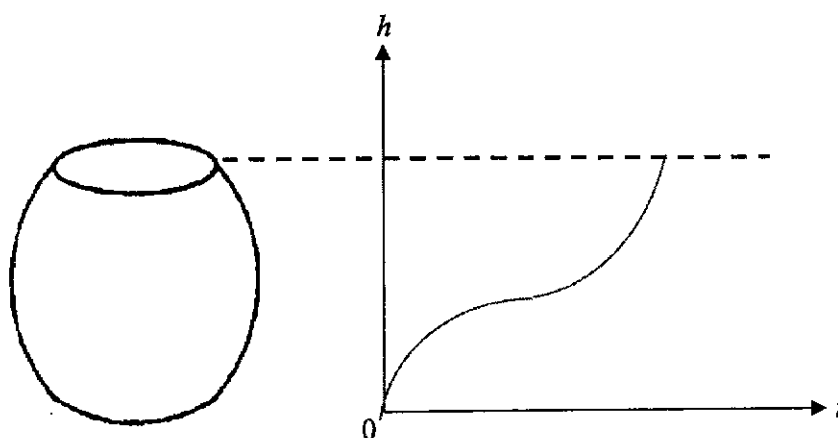
- 16 Water is poured at a constant rate into each of the containers shown below. In the diagram below, sketch the graphs to show the depth of water h in the containers as they are being filled with respect to time t .

(i)



[2]

(ii)



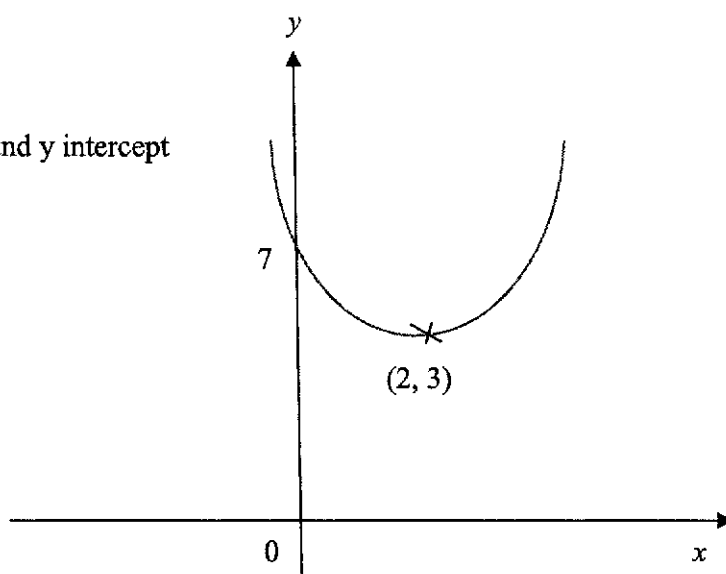
[2]

- 17 (i) Sketch the graph of $y = (x - 2)^2 + 3$.

Answer (i)

M1 – shape

M1 – turning point and y intercept



[2]

- (ii) Write down the coordinates of the minimum point of the curve.

Answer (.....2.....,3.....) [1]

- (iii) Write down the equation of the line of symmetry.

Answerx=2..... [1]

18 = Simplify

(i) $\frac{(2xy^3)^2}{\sqrt{x^2y^4}}$, leaving your answer in positive indices,

$$= \frac{4x^2y^6}{xy^2} \text{-----M1 (numerator)}$$

$$\text{-----M1 (denominator)}$$

$$= 4xy^4 \text{-----A1}$$

Answer [3]

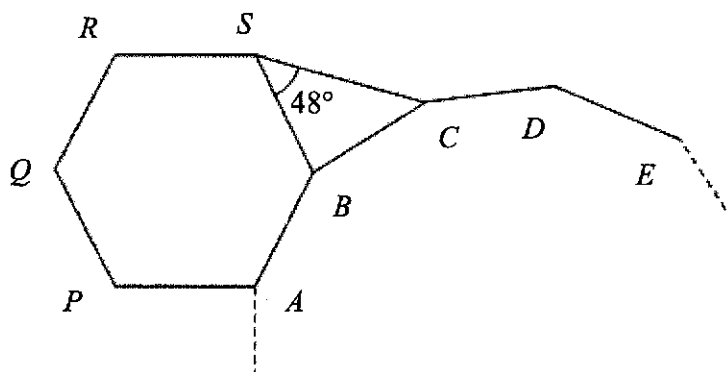
(ii) $\frac{3x}{(x-3)^2} + \frac{1}{x-3}$.

$$= \frac{3x+x-3}{(x-3)^2} \text{-----M1}$$

$$= \frac{4x-3}{(x-3)^2} \text{-----A1}$$

Answer [2]

- 19 In the diagram below which is not drawn to scale, $ABCDE$ is part of an n -sided regular polygon, $PQRSBA$ is a regular hexagon, CBS is an isosceles triangle and $\angle BSC = 48^\circ$.



By stating your reason(s) clearly, find

- (i) $\angle ABC$,

$$\angle SBA = \frac{180(6-2)}{6}$$

$$= 120 \text{-----M1}$$

$$\angle SBC = 180 - 48(2) = 84 \text{ (angle sum of isos triangle)----- M1}$$

$$\angle CBA = 360 - 84 - 120 = 156^\circ \text{ (angles at a pt)-----A1}$$

Answer $^\circ$ [3]

- (ii) the value of n .

$$\text{ext } \angle = 180 - 156$$

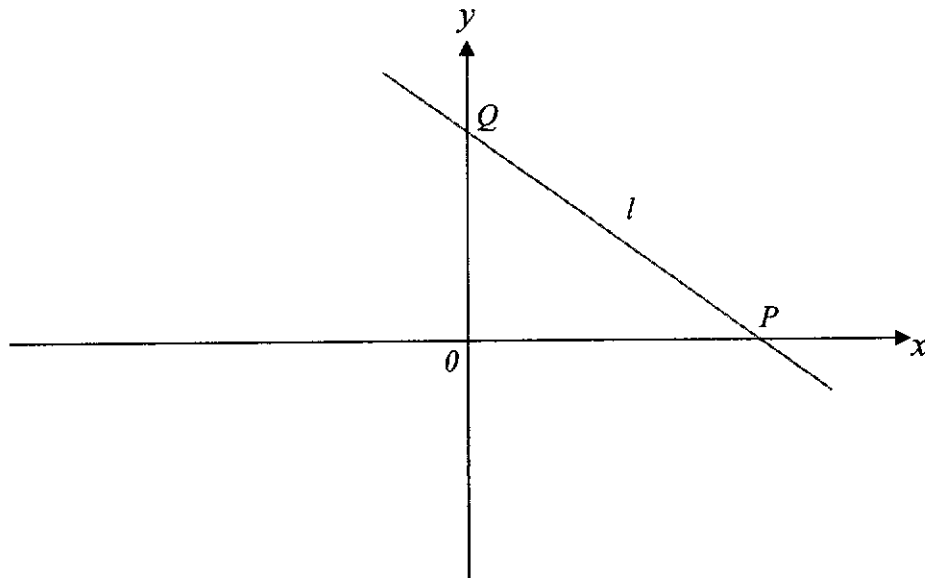
$$= 24$$

$$n = \frac{360}{24} \text{-----M1}$$

$$= 15 \text{-----A1}$$

Answer $n =$ [2]

- 20 The equation $2y + 8x = 18$ is a straight line l that crosses the x -axis at P and the y -axis at Q . Find



- (i) the coordinates of the points P and Q ,

Answer $P(\dots\dots\dots\frac{9}{4}\dots\dots\dots, \dots\dots\dots0\dots\dots\dots)$ [2]
 $Q(\dots\dots\dots0\dots\dots\dots, \dots\dots\dots9\dots\dots\dots)$

- (ii) the gradient of the line l ,

Answer $\dots\dots\dots-4\dots\dots\dots$ [1]

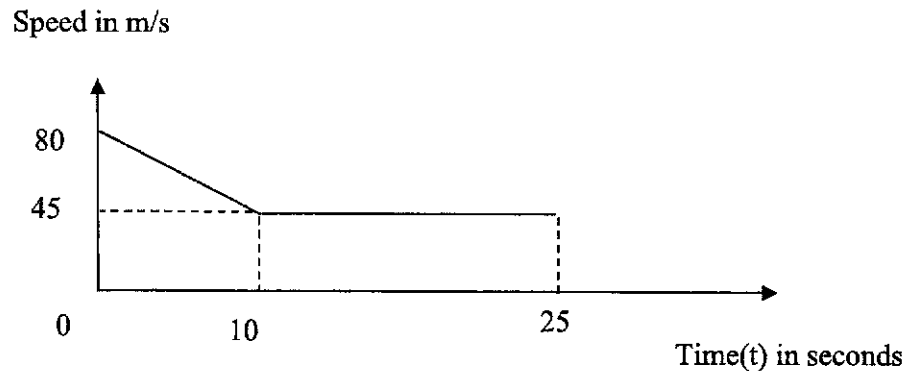
- (iii) the length of PQ ,

Answer $\dots\dots\dots9.28\dots\dots\dots$ units [1]

- (iv) the equation of a line which passes through the point $(0, -2)$ and is parallel to the line l .

Answer ... $y = -4x - 2$... [1]

- 21 The diagram is the speed-time graph of an object during a period of 25 seconds.



- (i) Calculate the retardation during the first 10 seconds.

$$\begin{aligned} \text{Retardation} &= \frac{80-45}{0-10} \text{-----M1} \\ &= -3.5 \text{ m/s}^2 \end{aligned} \quad [2]$$

Answer3.5.....m/s²

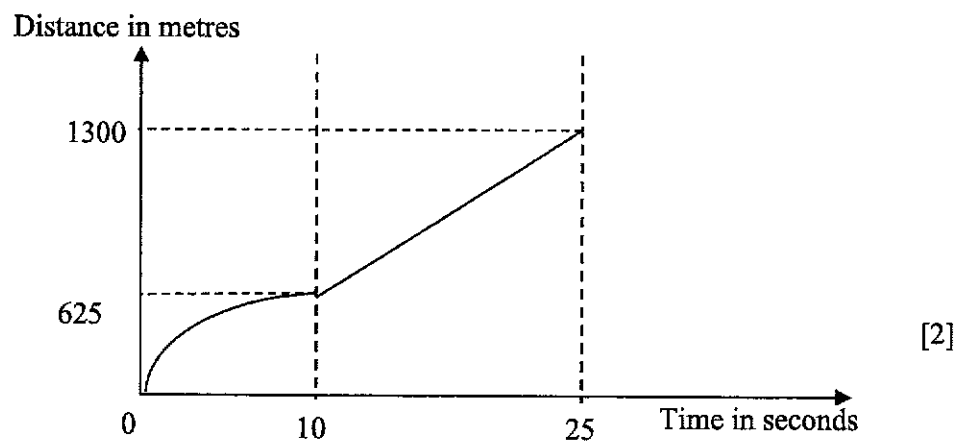
- (ii) Find the distance travelled by the object in the first 10 seconds.

$$\begin{aligned} \text{Distance} &= 0.5(80+45)(10) \\ &= 625 \end{aligned} \quad [2]$$

Answer305.....m/s

- (iii) On the axes in the answer space, complete the sketch of the distance-time graph for the object.

Answer



End of paper

1.	i) $x = \sqrt{5y+1}$ $x^2 = 5y+1$ -----M1 $x^2 - 1 = 5y$ $y = \frac{x^2 - 1}{5}$ -----A1
	ii) $\left(\frac{3x+1}{7}\right) \leq \left(\frac{5x-6}{4}\right)$ $4(3x+1) \leq 7(5x-6)$ -----M1 $12x+4 \leq 35x-42$ $-23x \leq -46$ -----M1 $x \geq 2$ -----A1
	iii) $3 - \frac{x+1}{3-x} = 0$ $3 = \frac{x+1}{3-x}$ $3(3-x) = x+1$ -----M1 $9-3x = x+1$ $8 = 4x$ $x = 2$ -----A1
	iv) $\frac{m^2-4}{(m-2)(m+3)}$ $= \frac{(m+2)(m-2)}{(m-2)(m+3)}$ -----M1 $= \frac{(m+2)}{(m+3)}$ -----A1

2.	i) $\angle ABC = 360 - 258$ (<i>angles at a pt</i>) $= 102^\circ$ -----M1 $\angle p = 180 - 102$ (<i>int $\angle$, $AB \parallel HC$</i>) $= 78^\circ$ -----A1 ii) $\angle GCF = 35^\circ$ (<i>alt. $\angle$, $GC \parallel FE$</i>) $\angle q = 102 - 35$ (<i>corr. $\angle$, $AB \parallel HE$</i>) -----M1 $= 67^\circ$ -----A1
3.	i) Grad of AB = $\frac{10-0}{20-14}$ $= \frac{5}{3}$ -----M1 Sub (14, 0), $0 = \frac{5}{3}(14) + c$ $c = -\frac{70}{3}$ -----M1 $y = \frac{5}{3}x - \frac{70}{3}$ or $3y = 5x - 70$ -----A1
	ii) $3p = 5(9) - 70$ $p = -\frac{25}{3}$ -----B1
4.	i) $T_5 = 36 - 15 = 21$ -----B1
	ii) $T_n = (n+1)^2 - 3n$ -----M1 $= n^2 + 2n + 1 - 3n$ $= n^2 - n + 1$ -----A1

	iii) $T_k = 73$ $k^2 - k + 1 = 73$ -----M1 $k^2 - k - 72 = 0$ $(k - 9)(k + 8) = 0$ $k = 9$ or $k = -8$ (rej) -----A1
5.	la) 600 cattles 30 days. 1 cattle 18000 days -----M1 225 cattles 80 days -----A1
	lb) 600 cattle 30 days 1 cattle 18000 days 400 cattle 45 days -----Bas1
	ii) $p + 11798.38 = p(1 + \frac{3}{100})^6$ -----M1 $p + 11798.38 = 1.19405229653p$ -----M1 $11798.38 = 0.19405229653p$ $p = 60800.00$ -----A1
	iii) A) s\$1.83= £ 1 $£5000 = 1.83 \times 5000$ $= s\$9150$ -----B1 b) £650=1.83 × 650 $= s\$1189.50$ -----M1 $\text{Selling price} = \frac{115}{100} \times 1189.50$ $= \$1367.925$ $= \$1367.93$ (2.dp) -----A1

6.	i) Time A to B = $\frac{240}{v}$ hrs -----B1 ii) Time B to A = $\frac{240}{v-10}$ hrs -----B1 iii) $\frac{240}{v-10} - \frac{240}{v} = \frac{1}{3}$ -----M1 $240(v)(3) - 240(3)(v-10) = v(v-10)$ -----M1 $720v - 720v + 7200 = v^2 - 10v$ $v^2 - 10v - 7200 = 0 \text{ (shown)}$ -----A1 iv) $v = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(-7200)}}{2(1)}$ -----M1 $v = \frac{10 \pm \sqrt{28900}}{2}$ $v = \frac{10 \pm 170}{2}$ -----M1 $v = 90$ or -80 (rej) -----A1 v) Time A to B + Time B to A = $\frac{240}{90} + \frac{240}{80}$ $= \frac{17}{3}$ $= 5\frac{2}{3}$ -----B1
8.	i) A) Vol. = $\frac{2}{3}\pi(20)^3 - \frac{1}{3}\pi(10)^2(10)$ -----M2 (1 mark each) $= 5000\pi$ $= 15707.963$ $= 15700 \text{ cm}^3$ -----B1 b) Total Surface Area = $2\pi(20)^2 + \pi(10)(\sqrt{10^2 + 10^2}) + (\pi(20)^2 - \pi(10)^2)$ -----M3 (1 mark each) $= 1100\pi + 10\sqrt{200}\pi$ $= 3900.40$ $= 3900 \text{ cm}^2$ -----A1

	ii) Mass of aluminium = $5000\pi(2.70)$ = 42.4 kg -----M1 Mass of copper = $5000\pi(8.96)$ = 141 kg (3sf)-----M1 Aluminium should be used. -----A1
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 Subject: Ans. Class: _____ Date: _____

