



PEICAI SECONDARY SCHOOL
SECONDARY 1 EXPRESS
END-OF-YEAR EXAMINATION 2018

CANDIDATE
NAME

CLASS

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REGISTER NUMBER

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MATHEMATICS

Paper 1

4048/01

5 October 2018

1 hour

Candidates answer on Question Paper

READ THESE INSTRUCTIONS FIRST

Write your register number, class and name on all the work you hand in.

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Answer **all** questions.

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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, 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 40.

	ANnotations	ACcuracy	Units
Marks Deducted	3	1	1

For Examiner's Use

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This document consists of 9 printed pages and 1 blank page.

Setter: Ms Nasreen

[Turn over

Mathematical Formulae**Compound Interest**

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

Mensuration

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

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

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

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

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

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

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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

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

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

Answer **all** questions

- 1 (a) Calculate $\frac{8.49}{36.7 - 0.45^2}$.
Write down the first five digits of your answer.

Answer [1]

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

Answer [1]

- 2 William bought a watch for \$235.
A year later he sold it for a profit of 150% of the cost price.
Calculate the selling price.

Answer \$ [2]

- 3 Consider the number pattern below.

29, 23, 17, 11,,

- (a) Write down the next two terms of this sequence.

Answer, [1]

- (b) What is the n^{th} term of the pattern?

Answer [1]

- 4 Melisa is travelling from Singapore to Hong Kong.
In Singapore, the exchange rate is 1 Singapore Dollar = 5.727 Hong Kong Dollars.
In Hong Kong, the exchange rate is 1 Hong Kong Dollar = 0.175 Singapore Dollars.
Melisa wants to change 350 Singapore Dollars into Hong Kong Dollars.
By showing your working clearly, justify whether she should change the money in Hong Kong or Singapore.

DANYAL EDUCATION Answer [3]

- 5 Cindy is drawing a triangle.
The first angle is x° .
The second angle is 5° more than the first angle.
The third angle is three times the size of the second angle.
Form an equation and solve it to find the size of the third angle.

DANYAL EDUCATION Answer [3]

- 6 The initial temperature of a liquid was -3.6°C at 8 a.m. Given that the temperature dropped by 2°C every 30 minutes, find
- (a) the final temperature of the liquid at 12 p.m.,

Answer $^{\circ}\text{C}$ [1]

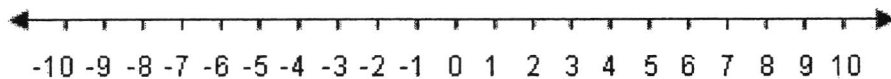
- (b) the time when the temperature of the liquid was -24.6°C .

Answer [2]

- 7 (a) Solve $19 - 2x < x + 28$.

Answer [2]

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



[1]

- (c) State the smallest integer value of x .

Answer $x =$ [1]

- 8 (a) Factorise $26ay - 50az$

Answer [1]

- (b) Solve $\frac{x}{4} + 17 = 9$.

Answer x = [1]

- (c) Expand and simplify $4(x + 7) - 3(x - 5)$.

Answer [2]

9 ABC is a triangular field. $AB = 75$ m , $\angle ABC = 127^\circ$ and $BC = 60$ m.

- (a) Leaving in all your arcs, construct a scale drawing of the field.
Use a scale of 1 cm to 10 m.

[2]

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- (b) Measure the angle BCA .

Answer [1]

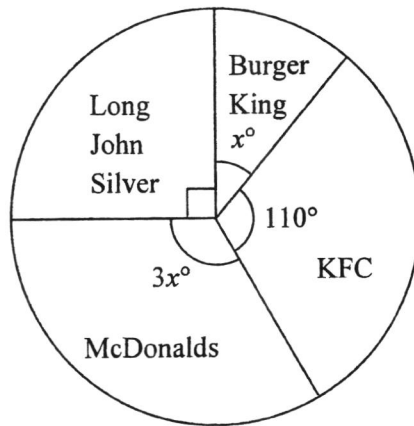
- (c) A path in the field is along the perpendicular bisector of AB .
Leaving in all your arcs, construct the path on your diagram.

[1]

- (d) The path meets the side AC at P . Find the actual distance AP in metres.

Answer [1]

- 10 The pie chart below shows the preferred fast food restaurants of a group of students who took part in a survey.



- (a) Find the value of x .

Answer [2]

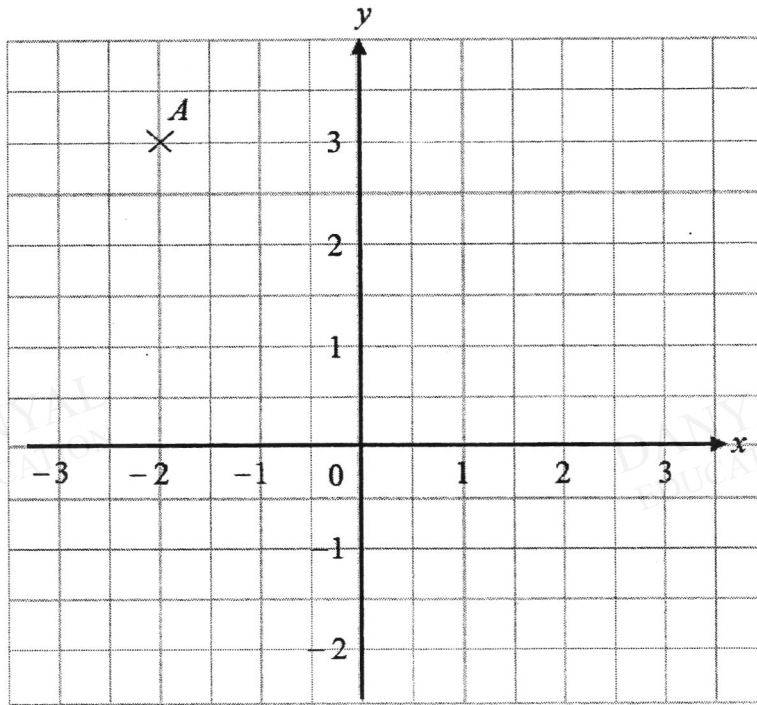
- (b) Calculate the fraction of students who prefers Burger King.

Answer [1]

- (c) If 385 students prefers KFC, how many students took part in the survey?

Answer [2]

11 A is a point in the coordinate plane.



(a) Write down the coordinates of A .

Answer [1]

(b) Plot and label clearly the point $B(2.5, -1.5)$ in the coordinate plane. [1]

(c) Find the gradient of AB .

Answer [2]

(d) (i) Draw and label the line $y = -1.5$ [1]

(ii) Calculate the area bounded the lines AB , $y = -1.5$ and the y -axis.

Answer [2]



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MATHEMATICS

Paper 2

4048/02

9 October 2018

1 hour 30 minutes

Additional Materials: Answer Paper
Graph Paper (1 sheet)

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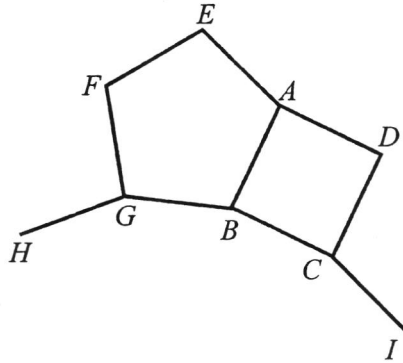
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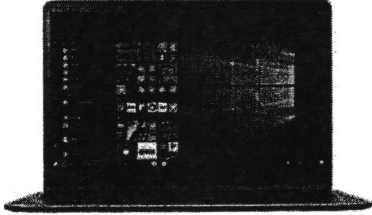
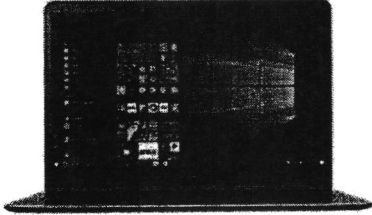
Answer all questions

- 1 $ABCD$ is a square and $ABGFE$ is a regular pentagon.



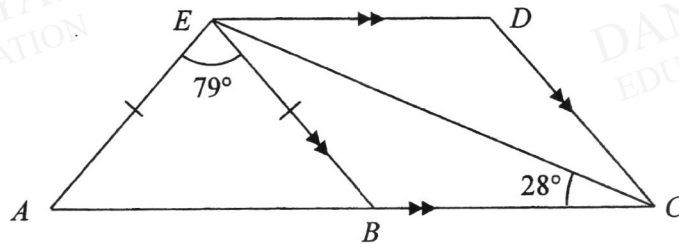
- (a) Find the angle EGF . [2]
- (b) $HGBCI$ is an incomplete regular polygon of n sides. Find the value of n . [2]
-
- 2 John rode a cycle at a speed of 16 km/h for 1 hour 45 minutes from Town A to Town B . He stopped and rested for half an hour at Town B . He continued to cycle at 8 km/h from Town B to Town C that is 20 km apart.
- (a) Find the distance, in kilometres, between Town A to Town B . [1]
- (b) Find the time taken for John to cycle from Town B to Town C .
Express your answer in hours and minutes. [2]
- (c) Find the average speed of his entire journey from Town A to Town C . [2]
-
- 3 (a) Express 1008 as the product of its prime factors. [2]
- (b) Given that $20250 = 2 \times 3^4 \times 5^3$.
Find the smallest positive integer k such that $20250k$ is a square number. [1]
- (c) Rectangular tiles, each 30 cm long and 24 cm wide, are laid on a flat surface to form a square. Find the minimum area of the square formed. [2]
-

- 4 Two stores advertise the same laptop during their grand opening as shown below.

	
Store A	Store B
\$2298 + 7% GST*	<ul style="list-style-type: none"> - Deposit of \$350 Plus 12 monthly payments of \$190 - Price includes 7% GST*
*GST: Goods and Service Tax	

- (a) Which store sells the laptop at a lower price? Justify your answer. [3]
 (b) Calculate the amount of GST charged on the laptop in Store B. [2]

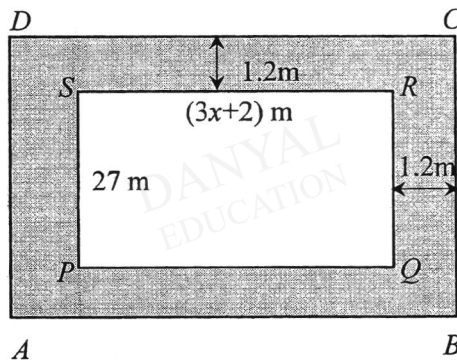
- 5 ED is parallel to BC and EB is parallel to DC . $ED = BC$ and $EB = DC$.
 Given that $\angle AEB = 79^\circ$ and $\angle BCE = 28^\circ$.



- (a) Find, stating your reasons clearly,
 (i) $\angle ABE$ [1]
 (ii) $\angle ECD$ [2]
 (iii) $\angle EDC$ [1]
 (b) State the special name of the quadrilateral $BCDE$. [1]

- 6 (a) Find the value of $a^3b - (3b)^2$ when $a = -\frac{5}{2}$ and $b = 7$. [1]
- (b) Simplify $\frac{3xy^2}{8z^3} \div \left(\frac{-6x^2y}{z^2}\right)$ [2]
- (c) Solve $\frac{x+2}{6} - \frac{3x-5}{7} = x$. [3]

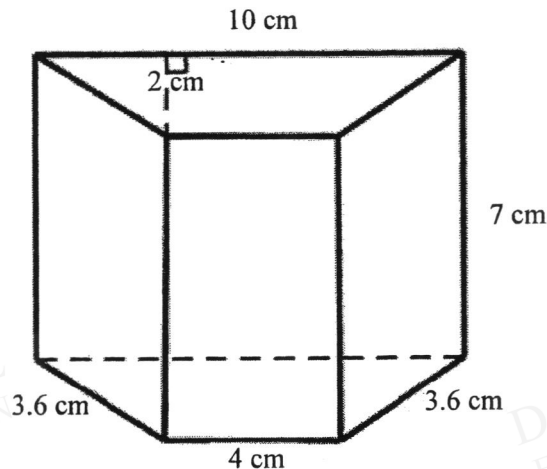
- 7 A uniform path of 1.2 m is built around a rectangular garden $PQRS$ of dimensions $(3x+2)$ m by 27 m as shown below.



Giving your answer in the simplest form, write down an expression in terms of x , to find

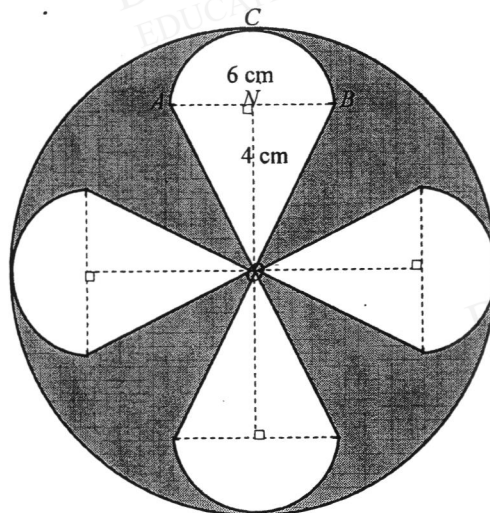
- (a) length of AB , [1]
- (b) the area of $PQRS$ and $ABCD$ respectively. [2]
- (c) Given that the area of the path is $140\frac{4}{25}$ square metres, form an equation to find the value of x . [3]

- 8 The figure below shows solid trapezoidal prism.



- (a) Find
- (i) the total surface area of the prism. [3]
- (ii) the volume of the prism. [2]
- (b) If the prism is melted and recast into a cylindrical bar of height 2 cm, find the radius of the cylindrical bar correct to 3 significant figures. [3]
(Take $\pi = 3.142$)

9



The diagram shows a design prototype for a new fan. It consists of a circular plate with 4 identical blades. Each blade consists of a semicircle ABC with centre N and diameter AB , and an isosceles triangle OAB . It is given that $OA = OB$, $ON = 4$ cm and $AB = 6$ cm. The centre of the plate is O .

- (a) (i) Calculate the area of each blade in terms of π . [3]
- (ii) Hence, find the area of the shaded region. [3]
- (b) Given that $OA = 5$ cm, find the perimeter of each blade. [2]

- 10 Shelly from class 1D1 of Peicai Secondary is going to take a bus to Bishan Park for Peicai Fun Run 2018. She can take either bus 53 or bus 156 to Bishan Park.

Below are some information on bus 53 and bus 156.

Bus 53

Fare Type	Card	Cash	Estimated Travel Time to reach Bishan Park (min)	Travel Distance (km)
Adult	\$0.77	\$1.40	9	2.6
Senior Citizen	\$0.54	\$1.00		
Student	\$0.37	\$0.65		

Adapted from: https://www.transilink.com.sg/eservice/eguide/service_route.php?service=53

Bus 156

Fare Type	Card	Cash	Estimated Travel Time to reach Bishan Park (min)	Travel Distance (km)
Adult	\$0.77	\$1.40	10	3.0
Senior Citizen	\$0.54	\$1.00		
Student	\$0.37	\$0.65		

Adapted from: https://www.transilink.com.sg/eservice/eguide/service_route.php?service=156

The table below shows the timings at which bus 53 and bus 156 would arrive at the bus stop nearest to Shelly's home.

Bus 53 (arrives every 6 minutes)	Bus 156 (arrives every 5 minutes)
0715,	0714,
0721,	0719,
0727,	0724,
0733,	0729,
0739,	0734,
0745,	0739,
0751,	0744,
.....

- (a) Shelly forgets to bring her EZ-link card and needs to use cash.

Calculate the percentage of the amount she can save if she uses her EZ-link card.

[2]

- (b) Shelly claims that bus 53 travels faster. Do you agree with her? Justify your reason with mathematical calculations.

[3]

- (c) Shelly leaves her home at 0720.
It takes her 8 minutes to walk to the bus stop from her home.
She has to reach Bishan Park no later than 0740.
Which bus should she take? Justify your choice with mathematical calculations.

[3]



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Answer **all** questions

- 1 (a) Calculate $\frac{8.49}{36.7 - 0.45^2}$.
Write down the first five digits of your answer.

Answer 0.2326 B1 [1]

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

Answer 0.233 B1 [1]

- 2 William bought a watch for \$235.
A year later he sold it for a profit of 150% of the cost price.
Calculate the selling price.

$$\begin{aligned} \text{Profit} &= \frac{150}{100} \times 235 \\ &= \$352.50 \end{aligned}$$

$$\begin{aligned} \text{Selling price} &= 235 + 352.50 \\ &= \$587.50 \end{aligned}$$

M1

A1

Answer \$ [2]

- 3 Consider the number pattern below.

29, 23, 17, 11, ,

- (a) Write down the next two terms of this sequence.

Answer 5, -1 B1 [1]

- (b) What is the n^{th} term of the pattern?

Answer $35 - 6n$ B1 [1]

- 4 Melisa is travelling from Singapore to Hong Kong.
 In Singapore, the exchange rate is 1 Singapore Dollar = 5.727 Hong Kong Dollars.
 In Hong Kong, the exchange rate is 1 Hong Kong Dollar = 0.175 Singapore Dollars.
 Melisa wants to change 350 Singapore Dollars into Hong Kong Dollars.
 By showing your working clearly, justify where she should change the money.

How many more Hong Kong Dollars will she get by changing the money in Singapore.

$$\begin{aligned}
 350 &= 350 \times 5.727 \\
 &= 2004.45 \text{ Hong Kong Dollars} \\
 \frac{350}{0.175} &= 2000 \text{ Hong Kong Dollars} \quad \text{M1} \\
 2004.45 - 2000 &= 4.45 \text{ Hong Kong Dollars} \quad \text{A1}
 \end{aligned}$$

Answer [2]

- 5 Cindy is drawing a triangle.
 The second angle is 5° more than the first angle.
 The third angle is three times the size of the second angle.
 Form an equation and solve it to find the size of the third angle.

Let x be the first angle.

$$\text{Second angle} = x + 5$$

$$\text{Third angle} = 3(x + 5)$$

$$x + x + 5 + 3(x + 5) = 180$$

$$x + x + 5 + 3x + 15 = 180$$

$$5x + 20 = 180$$

$$x = \frac{180 - 20}{5}$$

$$x = 32^\circ$$

$$3x = 111^\circ$$

M1

A1

Answer [3]

- 6 The initial initial temperature of a liquid was -3.6°C at 8 a.m. Given that the temperature dropped by 2°C every 30 minutes, find
 (a) the final temperature of the liquid at 12 p.m.,

Answer -19.6°C B1 [1]

- (b) the time when the temperature of the liquid was -24.6°C .

$$\frac{24.6 - 3.6}{4} = 5.25h \quad \text{M1}$$

Answer [2]

$$8\text{am} + 5.25h = 1315 \text{ or } 1.15\text{pm}$$

- 7 (a) Solve $19 - 2x < x + 28$.

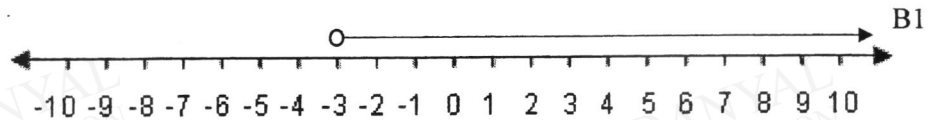
$$19 - 28 < 2x + x \quad \text{M1}$$

$$3x > -9$$

$$x > -3 \quad \text{A1}$$

Answer [2]

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



[1]

- (c) State the smallest integer value of x .

Answer $x =$ -2 B1 [1]

- 8 (a) Factorise $26ay - 50az$

Answer $2a(13y - 25z)$ B1 [1]

- (b) Solve $\frac{x}{4} + 17 = 9$

Answer $x =$ -32 B1 [1]

- (c) Expand and simplify $4(x + 7) - 3(x - 5)$.

$$4x + 28 - 3x + 15 \quad \text{M1}$$

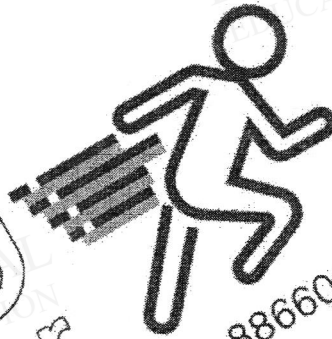
$$= x + 43 \quad \text{A1}$$

Answer [2]

9 ABC is a triangular field. $AB = 75$ m , $\angle ABC = 127^\circ$ and $BC = 60$ m.

- (a) Leaving in all your arcs, construct a scale drawing of the field.
Use a scale of 1 cm to 10 m.

[2]

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- (b) Measure the angle BCA .

Answer [1]

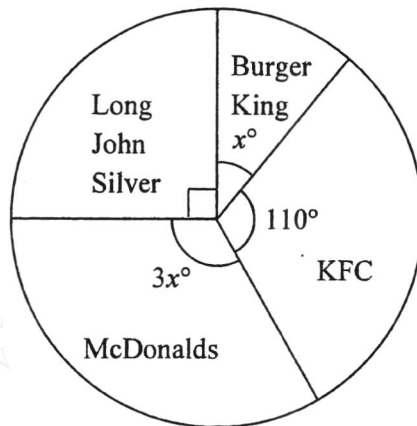
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[1]

- (d) The path meets the side AC at P . Find the actual distance AP in metres.

Answer [1]

- 10 The pie chart below shows the preferred fast food restaurants of a group of students who took part in a survey.



- (a) Find the value of x .

$$4x + 90 + 110 = 360 \quad \text{M1}$$

$$x = \frac{360 - 90 - 110}{4}$$

40°

A1

Answer [2]

- (b) Calculate the fraction of students who prefers Burger King.

$\frac{1}{9}$ B1

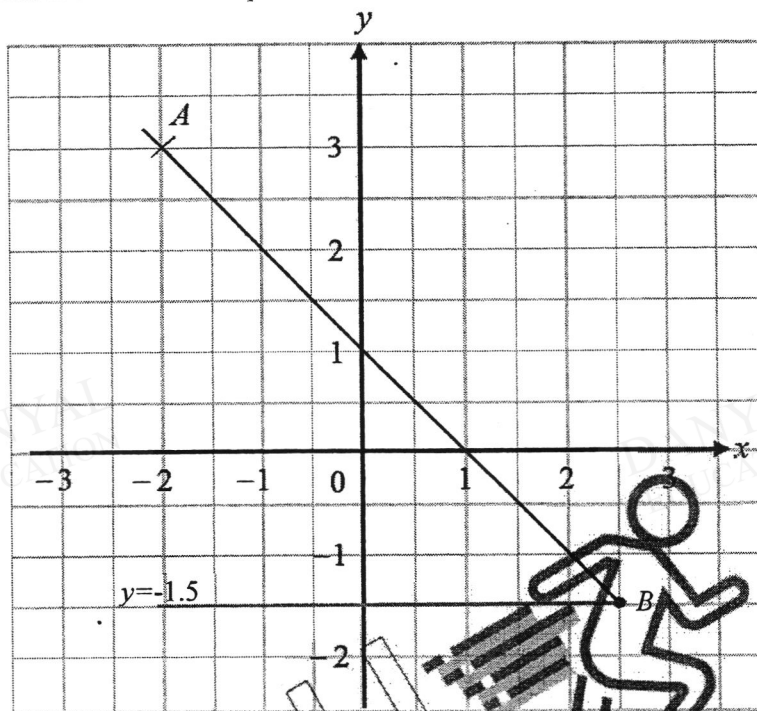
Answer [1]

- (c) If 385 students prefers KFC, how many students took part in the survey?

$$\begin{aligned} \frac{385}{110} \times 360 & \quad \text{M1} \\ = 1260 & \quad \text{A1} \end{aligned}$$

Answer [2]

- 11 A is a point in the coordinate plane.



- (a) Write down the coordinates of A .

Answer: $(-2, 3)$ B1 [1]

- (b) Plot and label clearly the point $B(2.5, -1.5)$ in the coordinate plane. [1]

- (c) Connect A and B and find the gradient of AB .

$$\begin{aligned} \text{Gradient} &= \frac{\text{Rise}}{\text{Run}} \\ &= -\frac{4.5}{4.5} \quad \text{M1} \\ &= -1 \quad \text{A1} \end{aligned}$$

Answer [2]

- (d) (i) Draw and label the line $y = -1.5$ [1]

- (ii) Calculate the area bounded the lines AB , $y = -1.5$ and the y -axis.

$$\begin{aligned} \frac{1}{2} \times 2.5 \times 2.5 & \quad \text{M1} \\ = 3.125 \text{ or } 3\frac{1}{8} \text{ units}^2 & \quad \text{A1} \end{aligned}$$

Answer [2]



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Setter: Ms Nasreen

[Turn over

Mathematical Formulae*Compound Interest*

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

Mensuration

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

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

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

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

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

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

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

Trigonometry

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

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

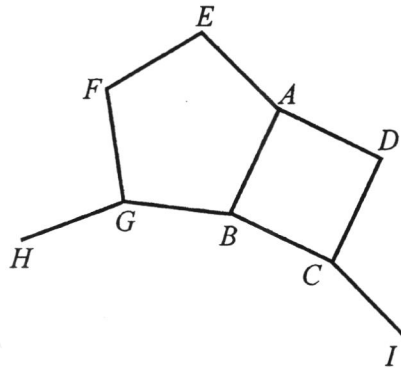
Statistics

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

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

Answer all questions

- 1 $ABCD$ is a square and $ABGFE$ is a regular pentagon.



- (a) Find the angle EGF . [2]
 (b) $HGBCI$ is an incomplete regular polygon of n sides. Find the value of n . [2]

1a	<p>Sum of int. opp angles = Ext angle of pentagon $= \frac{360}{5} = 72^\circ$</p> $\angle EGF = \frac{72}{2} = 36^\circ$ <p>OR</p> $\angle GFE = \frac{180 \times 3}{5} = 108^\circ \text{ (int. angle of polygon)}$ $\angle EGF = \frac{180 - 108}{2} = 36^\circ \text{ (base angle of isos. \(\Delta\))}$	M1 A1 88660031
1b	<p>Each int angle of polygon $HGBCI = 360 - 90 - 108$ $= 162^\circ$</p> <p>Ext angle of each polygon $HGBCI = 180 - 162$ $= 18^\circ$</p> <p>No. of sides = $\frac{360}{18}$ $= 20$</p>	M1 A1 DANYAL EDUCATION

- 2 John rode a cycle at a speed of 16 km/h for 1 hour 45 minutes from Town A to Town B. He stopped and rested for half an hour at Town B. He continued to cycle at 8 km/h from Town B to Town C that is 20 km apart.
- (a) Find the distance, in kilometres, between Town A to Town B. [1]
- (b) Find the time taken for John to cycle from Town B to Town C.
Express your answer in hours and minutes. [2]
- (c) Find the average speed of his entire journey from Town A to Town C. [2]


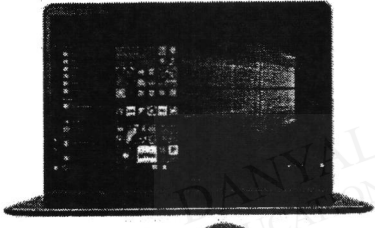
2a	Distance between Town A to B $= 16 \times 1\frac{3}{4}$ $= 28 \text{ km}$	B1
2b	Time taken $= \frac{20}{8}$ $= 2 \text{ h } 30 \text{ minutes}$	M1 A1
2c	Avg speed $= \frac{28 + 20}{1\frac{3}{4} + \frac{1}{2} + 2\frac{1}{2}}$ $= 10 \text{ km/h}$ or $10\frac{2}{19} \text{ km/h}$	A1

- 3 (a) Express 1008 as the product of its prime factors. [2]
- (b) Given that $20250 = 2 \times 3^4 \times 5^3$.
Find the smallest positive integer k such that $20250k$ is a square number. [1]
- (c) Rectangular tiles, each 30 cm long and 24 cm wide, are laid on a flat surface to form a square. Find the minimum area of the square formed. [2]

1a	$\begin{array}{r} 2 \overline{) 1008} \\ \underline{200} \\ 200 \\ \underline{200} \\ 0 \end{array}$ $\begin{array}{r} 2 \overline{) 504} \\ \underline{200} \\ 304 \\ \underline{252} \\ 52 \\ \underline{42} \\ 10 \\ \underline{10} \\ 0 \end{array}$ $\begin{array}{r} 2 \overline{) 252} \\ \underline{200} \\ 52 \\ \underline{42} \\ 10 \\ \underline{10} \\ 0 \end{array}$ $\begin{array}{r} 2 \overline{) 126} \\ \underline{100} \\ 26 \\ \underline{21} \\ 5 \\ \underline{5} \\ 0 \end{array}$ $\begin{array}{r} 3 \overline{) 63} \\ \underline{30} \\ 33 \\ \underline{30} \\ 3 \\ \underline{3} \\ 0 \end{array}$ $\begin{array}{r} 3 \overline{) 21} \\ \underline{15} \\ 6 \\ \underline{6} \\ 0 \end{array}$ $\begin{array}{r} 7 \overline{) 7} \\ \underline{7} \\ 0 \end{array}$ $1008 = 2^4 \times 3^2 \times 7$	M1 for tree or repeated fraction method A1
1b	$k = 10$	B1
1c	$30 = 2 \times 3 \times 5$ $24 = 2^3 \times 3$ $\text{LCM} = 2^3 \times 3 \times 5 = 120$	M1

$\begin{aligned} \therefore \text{Min area} &= (120)^2 \\ &= 14\,400 \text{ cm}^2 \end{aligned}$	A1
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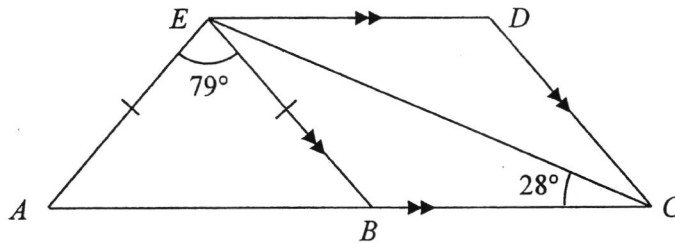
- 4 Two stores advertise the same laptop during their grand opening as shown below.

	
Store A	Store B
\$2298 + 7% GST*	<ul style="list-style-type: none"> - Deposit of \$350 Plus 12 monthly payments of \$190 - Price includes 7% GST*
*GST: Goods and Service Tax	

- (a) Which store sells the laptop at a lower price? Justify your answer. [3]
 (b) Calculate the amount of GST charged on the laptop in Store B. [2]

4a	Store A: $\begin{aligned} \text{Cost of laptop} &= 1.07 \times 2298 \\ &= \$2458.86 \end{aligned}$	M1
	Store B: $\begin{aligned} \text{Cost of laptop} &= 350 + 12(190) \\ &= \$2630 \end{aligned}$	M1
	Store A sells it at lower price.	A1
4b	$\begin{aligned} &\frac{2630}{107} \times 7 \\ &= \$172.06 \text{ (to 2dp)} \end{aligned}$	M1 A1

- 5 ED is parallel to BC and EB is parallel to DC . $ED = BC$ and $EB = DC$.
Given that $\angle AEB = 79^\circ$ and $\angle BCE = 28^\circ$.



- (a) Find, stating your reasons clearly,

(i) $\angle ABE$

(ii) $\angle ECD$

(iii) $\angle EDC$

- (b) State the special name of the quadrilateral $BCDE$.

[1]

[2]

[1]

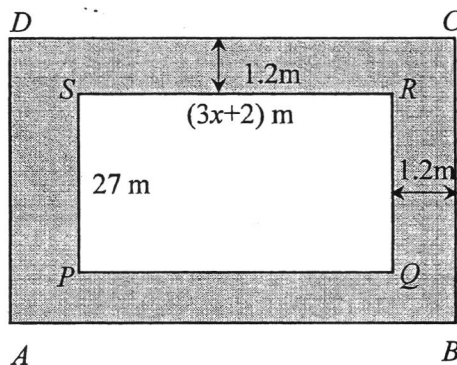
[1]

5ai	$\angle ABE = \frac{180 - 79}{2}$ [base angles of isos Δ] $= 50.5^\circ$	B1
5aai	$\angle BEC = 50.5 - 28$ [ext angle = sum of int opp angles] $= 22.5^\circ$	M1
	$\angle BEC = \angle ECD$ [alt. angle, $EB \parallel DC$]	A1
5aiii	$\angle EDC = \angle BEC$ [opp. angles of //gram] $= 180 - 50.5$ $= 129.5^\circ$	B1
5b	Parallelogram	B1

- 6 (a) Find the value of $a^3b - (3b)^2$ when $a = -\frac{5}{2}$ and $b = 7$. [1]
- (b) Simplify $\frac{3xy^2}{8z^3} \div \left(\frac{-6x^2y}{z^2}\right)$ [2]
- (c) Solve $\frac{x+2}{6} - \frac{3x-5}{7} = x$. [3]

6a	-550.375 or $-550\frac{3}{8}$	B1
6b	$\frac{y}{16xz}$	B1 for simplifying alphabet B1 for simplifying variables
6c	$\frac{x+2}{6} - \frac{3x-5}{7} = x$ $7(x+2) - 6(3x-5) = 42x$ $7x+14 - 18x+30 = 42x$ $53x = 44$ $x = \frac{44}{53} \text{ or } 0.830 \text{ (to 3sf)}$	M1 M1 A1

- 7 A uniform path of 1.2 m is built around a rectangular garden $PQRS$ of dimensions $(3x+2)$ m by 27 m as shown below.

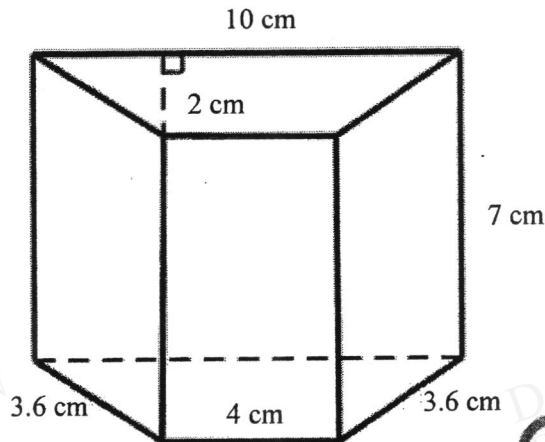


Giving your answer in the simplest form, write down an expression in terms of x , to find

- (a) length of AB , [1]
 (b) the area of $PQRS$ and $ABCD$ respectively. [2]
 (c) Given that the area of the path is $140\frac{4}{25}$ square metres, form an equation to find the value of x . [3]

6a	$3x+2+2.4$ $=3x+4.4$ m	B1
6b	Area of $PQRS = 27(3x+2)$ m Area of $ABCD = 29.4(3x+4.4)$ m	B1 B1
6c	$29.4(3x+4.4) - 27(3x+2) = 140\frac{4}{25}$ $88.2x + 129.36 - 81x - 54 = 140.16$ $7.2x = 64.8$ $x = 9$ m	M1 M1 A1

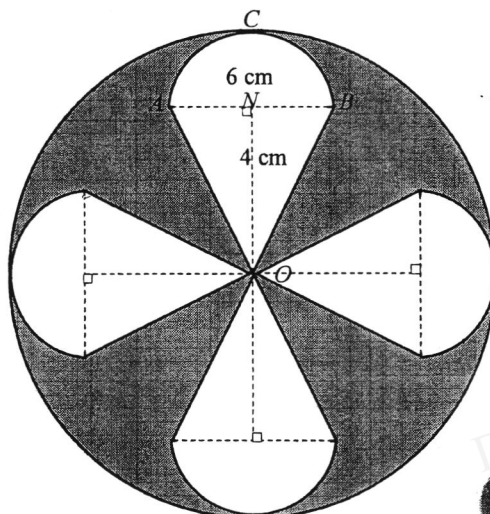
- 8 The figure below shows solid trapezoidal prism.



- (a) Find
- (i) the total surface area of the prism. [2]
- (ii) the volume of the prism. [2]
- (b) If the prism is melted and recast into a cylindrical bar of height 2 cm, find the radius of the cylindrical bar correct to 3 significant figures. [3]
(Take $\pi = 3.142$)

9ai	$\text{Total Surface area} = \text{Lateral surface area} + 2 \times \text{Base area}$ $\text{Lateral surface area} = 2 \times 2 \times 7$ $= 28 \text{ cm}^2$ $2 \text{ Base areas} = 2 \left[\frac{1}{2} \times (7 + 10) \times 2 \right]$ $= 38 \text{ cm}^2$ $\text{Total Surface area} = 28 \text{ cm}^2 + 38 \text{ cm}^2$ $= 66 \text{ cm}^2$	M1 M1 A1
9aii	$\text{Vol. of prism} = \text{Base area} \times \text{height}$ $= \left[\frac{1}{2} \times (7 + 10) \times 2 \right] \times 7$ $= 98 \text{ cm}^3$	M1 A1
9b	$\text{vol. of prism} = \text{vol. of cylinder}$ $\text{So, } \pi r^2 h = 98$ $\pi r^2 (2) = 98$ $r^2 = \frac{98}{2(3.142)}$ $r = \sqrt{\frac{98}{2(3.142)}}$ $= 3.95 \text{ cm (to 3sf)}$	M1 M1 A1

- 9 In the diagram, $BCDE$ is a quadrilateral and $\triangle ABE$ is an isosceles triangle.



The diagram shows a design prototype for a new fan. It consists of a circular plate with 4 identical blades. Each blade consists of a semicircle ABC with centre N and diameter AB , and an isosceles triangle OAB . It is given that $OA = OB$, $ON = 4$ cm and $AB = 6$ cm. The centre of the plate is O .

- (a) (i) Calculate the area of each blade in terms of π . [3]
 (ii) Hence, find the area of the shaded region. [3]
 (b) Given that $OA = 5$ cm, find the perimeter of each blade. [2]

9ai	Area of semicircle $ACB = \frac{1}{2} \pi r^2$ $= \frac{1}{2} \pi (3)^2$ $= 4.5 \pi \text{ cm}^2$	M1
	Area of $\triangle OAB = \frac{1}{2} \times 6 \times 4 = 12 \text{ cm}^2$	M1
	Area of each blade = $12 + 4.5 \pi \text{ cm}^2$	A1
9aii	Area of circular plate = πr^2 $= \pi (7)^2$ $= 49 \pi \text{ cm}^2$	M1
	Area of shaded region = $49 \pi - 4[12 + 4.5 \pi]$ $= 49 \cdot 389$ $= 49 \cdot 4 \text{ cm}^2 \text{ (to 3sf)}$	M1 A1
9b	Perimeter of semicircle $= \frac{1}{2} [2 \pi r]$ $= \pi (3)$ $= 3 \pi \text{ cm}$	M1
	Perimeter of each blade = $3 \pi + 10 \text{ cm}$ $= 19 \cdot 4 \text{ cm (to 3sf)}$	A1

- 10 Shelly from class 1D1 of Peicai Secondary is going to take a bus to Bishan Park for Peicai Fun Run 2018. She can take either bus 53 or bus 156 to Bishan Park.

Below are some information on bus 53 and bus 156.

Bus 53

Fare Type	Card	Cash	Estimated Travel Time to reach Bishan Park (min)	Travel Distance (km)
Adult	\$0.77	\$1.40	9	2.6
Senior Citizen	\$0.54	\$1.00		
Student	\$0.37	\$0.65		

Adapted from: https://www.transilink.com.sg/eservice/eguide/service_route.php?service=53

Bus 156

Fare Type	Card	Cash	Estimated Travel Time to reach Bishan Park (min)	Travel Distance (km)
Adult	\$0.77	\$1.40	10	3.0
Senior Citizen	\$0.54	\$1.00		
Student	\$0.37	\$0.65		

Adapted from: https://www.transilink.com.sg/eservice/eguide/service_route.php?service=156

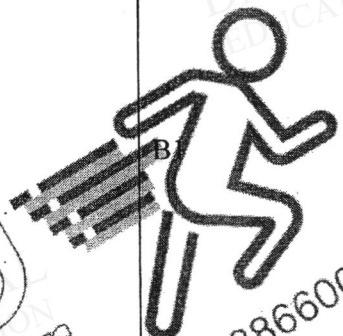
The table below shows the timings at which bus 53 and bus 156 would arrive at the bus stop nearest to Shelly's home.

Bus 53 (arrives every 6 minutes)	Bus 156 (arrives every 5 minutes)
0715,	0714,
0721,	0719,
0727,	0724,
0733,	0729,
0739,	0734,
0745,	0739,
0751,	0744,
.....

- (a) Shelly forgets to bring her EZ-link card and needs to use cash.
Calculate the percentage of the amount she can save if she uses her EZ-link card. [2]

- (b) Shelly claims that bus 53 travels faster. Do you agree with her?
Justify your reason with mathematical calculations. [3]

- (c) Shelly leaves her home at 0720.
It takes her 8 minutes to walk to the bus stop from her home.
She has to reach Bishan Park no later than 0740.
Which bus should she take? Justify your choice with mathematical calculations. [3]

(a)	Extra amount paid = $0.65 - 0.37$ = \$0.28	
(a)	Percentage saved $= \frac{0.28}{0.37} \times 100\%$ $= 75.7\%$	M1 B1
(b)	<p>Average speed of Bus 53</p> $= \frac{2.6}{9}$ $= 0.289 \text{ or } \frac{13}{45} \text{ km/min}$ <p>Average speed of Bus 156</p> $= \frac{3}{10}$ $= 0.3 \text{ km/min}$ <p>Therefore, Shelly's claim is incorrect as $0.3 \text{ km/min} > 0.289 \text{ km/min}$, the average speed of Bus 156 is greater than that of bus 53.</p> <p>OR</p> <p>Therefore, Shelly's claim is incorrect as the average speed of Bus 156 is 0.011 km/min faster than that of Bus 53.</p>	 B1 B1 (give A1 if only state Bus 156 average speed is faster.)
(c)	Shelly arrival time at bus stop is 0728	

	<p>If she took Bus 53 at 0733, she will arrive at Bishan Park at 0742 (9 minutes of travelling time).</p> <p>If she took Bus 156 at 0729, she will arrive at Bishan Park at 0739 (10 minutes of travelling time).</p> <p>Therefore, Shelly should take bus 156 as she needs to reach Bishan Park bus stop no later than 0740.</p>	<p>B1</p> <p>B1</p> <p>B</p>
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