



**BEATTY SECONDARY SCHOOL
END OF YEAR EXAMINATION 2018**

SUBJECT : Mathematics

LEVEL : Sec 2 Normal (A)

PAPER : 1

DURATION : 1 hour 15 minutes

SETTER : Ms Estella Chin

DATE : 8 October 2018

| | | |
|----------------|---------------|-----------------|
| CLASS : | NAME : | REG NO : |
|----------------|---------------|-----------------|

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces on the top of this page.

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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 **50**.

| |
|---------------------------|
| For Examiner's Use |
| 50 |

This paper consists of **11** printed pages (including this cover page)

[Turn over

Mathematical Formulae*Mensuration*

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

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

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

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

1 Simplify

(a) $\frac{8ab^2}{10a^2b}$,

Answer [1]

(b) $\frac{3(t+1)}{2} - \frac{5t}{3}$.

Answer [2]

2 (a) Solve the inequality $16 - 3x \leq 5$.

Answer [2]

(b) Draw a number line to represent the solution of the inequality found in (a).

Answer

[2]

(c) Hence, state the minimum integer value of x .

Answer [1]

- 3 (a) Factorise $6r^2 - 7r - 5$.

Answer _____ [2]

- (b) Given that $r = 3$, evaluate the factors found in part (a).

Answer _____ and _____ [2]

-
- 4 (a) Factorise $xy - yz$.

Answer _____ [1]

- (b) Hence, evaluate $143 \times 98 - 98 \times 43$, without the use of a calculator.

Answer _____ [2]

[Turn over

5 An area of 4 cm^2 on a map represents an actual area of 9 km^2 .

- (a) If the actual area of a theme park is 13.5 km^2 , find the area, in cm^2 , of the theme park on the map.

Answer cm^2 [2]

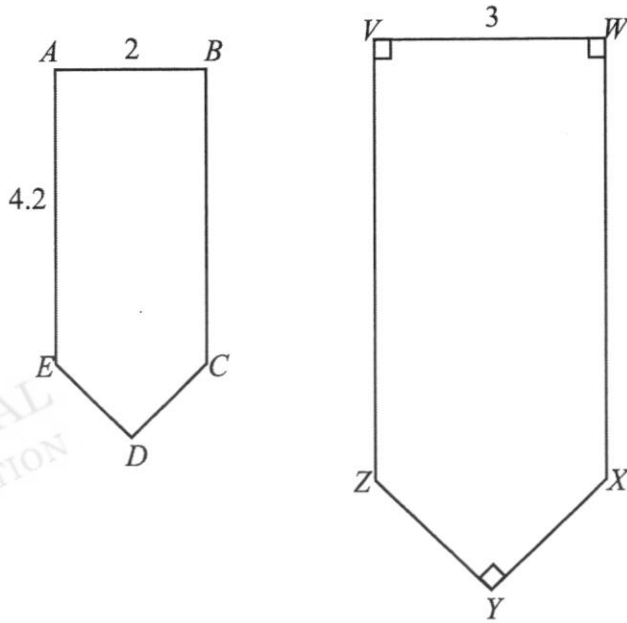
- (b) Find the scale of the map in the form $1 : r$.

Answer : [2]

- (c) If the distance between two buildings on the map is 5 cm , calculate the actual distance, in km , between the two buildings.

Answer km [2]

- 6 In the diagram below, pentagons $ABCDE$ and $VWXYZ$ are similar. $AB = 2$ cm, $AE = BC = 4.2$ cm, $VW = 3$ cm, $\angle ZVW = \angle VWX = \angle XYZ = 90^\circ$ and $XY = YZ$.



Find

- (a) $\angle VZY$,

Answer [2]

- (b) the length of WX .

Answer cm [2]

[Turn over

- 7 Elle wanted to organise a party for x number of people. She bought one cup of ice cream per person, and a total of $(2x+10)$ chicken wings and $(3x-15)$ fishballs.
- (a) Write an expression in terms of x , for the total number of items Elle bought for the party. Simplify your answer.

Answer [1]

- (b) 3 people did not attend the party. Elle distributed the items equally among the people at the party and found that each of them received 7 items.

- (i) Using the information provided, form an algebraic equation in terms of x .

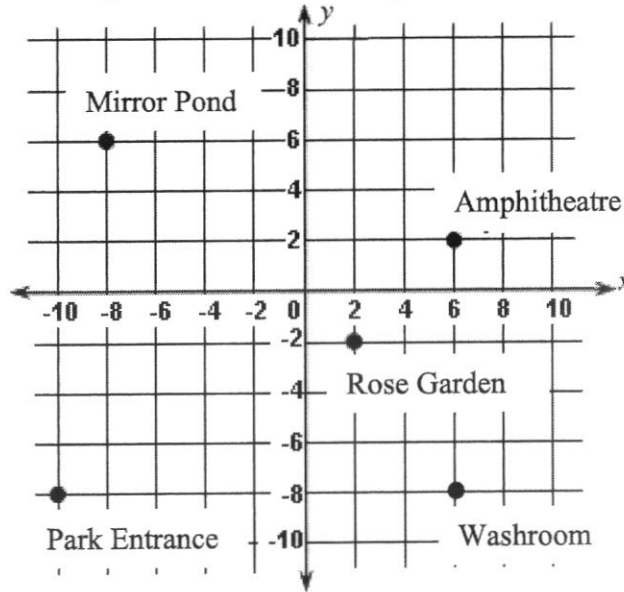
Answer

[1]

- (ii) Solve the equation in (b)(i) and find the number of people who attended the party.

Answer [3]

- 8 The Cartesian coordinate plane below shows the positions of four locations in a park.



- (a) Write down the coordinates of the Amphi theatre.

Answer _____ (,) [1]

- (b) Write down the name of the place at $(6, -8)$.

Answer _____ [1]

- (c) Mark the origin on the given axes. Label the origin O .

[1]

- (d) Calculate the gradient of the line formed between the coordinates representing the Park Entrance and the Mirror Pond.

Answer _____ [1]

- (e) Roy is standing at the Park Entrance. He wants to visit the Rose Garden. Calculate the shortest distance (in units) that he would need to walk.

Answer _____ [2]

- 9 The total number of hours spent using the computer in a week by 12 students are shown in the stem-and-leaf diagram below.

| Stem | Leaf |
|------|-------------|
| 0 | 8 |
| 1 | 2 4 4 k 8 |
| 2 | 5 5 |
| 3 | 0 8 |
| 4 | 1 9 |

Key: 1 | 2 means 12 hours

- (a) Given that the mode is 14 hours, find the value of k .

Answer $k =$ _____ [1]

- (b) Find
(i) the mean number of hours,

Answer _____ hours [2]

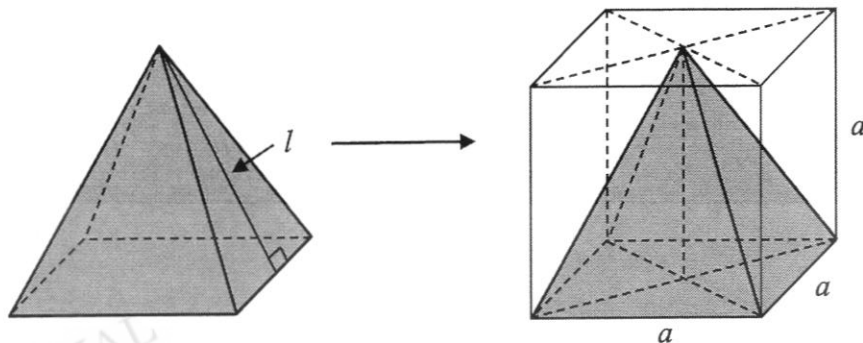
- (ii) the median number of hours.

Answer _____ hours [1]

- (c) A teacher selects one student at random to do a project on cyber wellness. Calculate the probability that the student selected spent more than 35 hours using the computer in that week.

Answer _____ [2]

- 10 A solid square pyramid toy, which has a slant height l , fits exactly into a cubic gift box, measuring a cm by a cm by a cm, as shown in the diagram.



- (a) State the ratio of the volume of the pyramid toy to the volume of the cubic gift box.

Answer _____ : _____ [1]

- (b) Given that the volume of the pyramid toy is 1125 cm^3 , show that the value of a is 15.

Answer

[2]

[Turn over

- (c) (i) Calculate the slant height, l , of the pyramid toy.

Answer $l =$ cm [2]

- (ii) Calculate the total surface area of the pyramid toy.

Answer cm^2 [3]

End of paper ☺



BEATTY SECONDARY SCHOOL
END OF YEAR EXAMINATION 2018

SUBJECT : Mathematics

LEVEL : Sec 2 Normal (A)

PAPER : 2

DURATION : 1 hour 30 minutes

SETTER : Ms Yu Lingling

DATE : 10 Oct 2018

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Mathematical Formulae*Mensuration*

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

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

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

Answer **all** the questions.

- 1 By rounding each number to 1 significant figure, estimate the value of $\frac{3456 \times 0.987}{25}$.

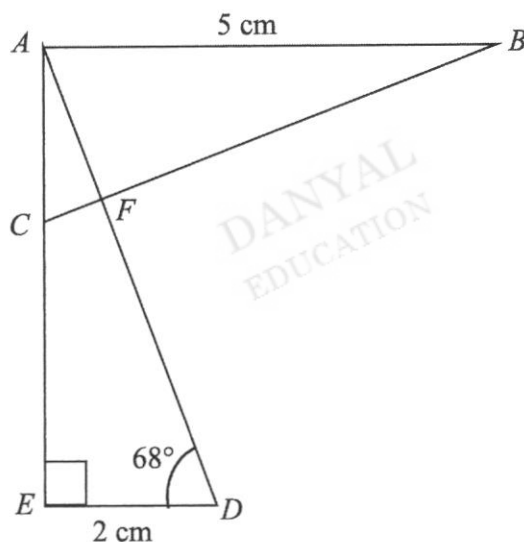
You must show your working clearly. [2]

- 2 In the diagram, $\triangle ABC$ is congruent to $\triangle EAD$. Given that $AB = 5$ cm, $ED = 2$ cm, $\angle ADE = 68^\circ$, $\angle AED = 90^\circ$ and AD meets BC at F , find

(a) the length of CE , [1]

(b) $\angle ABC$, [2]

(c) the length of BC , giving your answer to 3 significant figures. [2]



- 3 Adrian needs to save at least \$147 before he has enough money to buy his grandmother a gift.

(a) Given that he saves \$16 every week, find an expression in terms of x , for the amount of money he will save in x weeks. [1]

(b) By forming an inequality in x and solving it, find the least number of weeks needed for Adrian to save up sufficient money to buy the gift. [2]

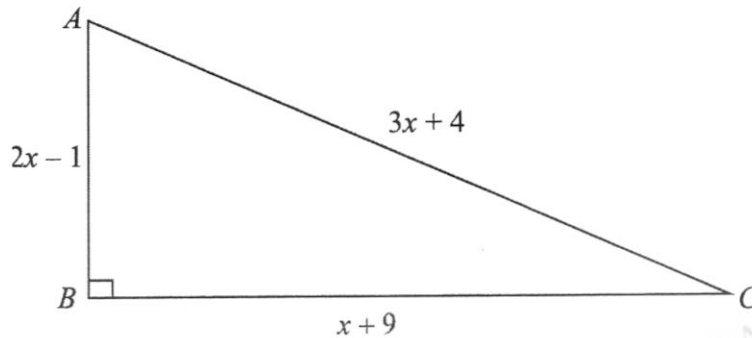
- 4 (a) Solve the equation $1 - \frac{2f-3}{2} = \frac{f+2}{5}$. [3]
- (b) Simplify $\frac{2p-3}{(q-4)^3} \div \frac{8p^2-12q}{(q-4)^2}$, giving your answer as a single fraction in its lowest terms. [3]
- (c) Given that $2a^2 - 2b^2 = 70$ and $a - b = 7$, find the value of $a + b$. [3]

- 5 A survey was conducted among 50 families to find out the number of times they travelled together as a family in 2017. The data collected is shown in the table below.

| | | | | | |
|---------------------------|----|-----|----|---|-----|
| Number of times travelled | 0 | 1 | 2 | 3 | 4 |
| Number of families | 15 | a | 11 | 7 | b |

- (a) Show that $a + b = 17$. [1]
- (b) If the mean number of times they travelled as a family is 1.68, show that $a + 4b = 41$. [2]
- (c) Solve the two equations in (a) and (b) simultaneously. [2]
- (d) Find the percentage of families that travelled at most 2 times. [2]

- 6 The diagram shows $\triangle ABC$ in which $\angle ABC = 90^\circ$, $AB = (2x - 1)$ cm, $BC = (x + 9)$ cm and $AC = (3x + 4)$ cm.



- (a) Using Pythagoras' Theorem, form an equation in x and show that it reduces to $2x^2 + 5x - 33 = 0$. [3]
- (b) Write down an expression, in terms of x , for the area of $\triangle ABC$. Expand and simplify your answer. [2]

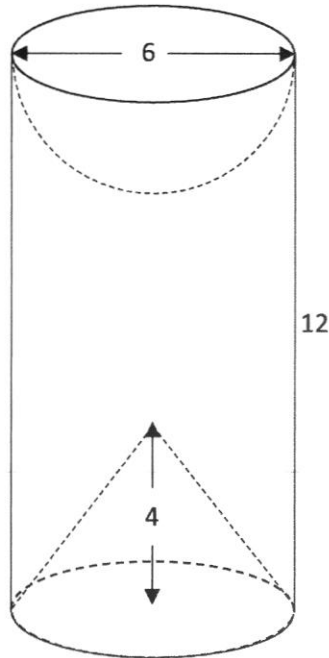
7 **Answer the whole of this question on a sheet of graph paper.**

The table below shows some corresponding x and y values for the equation $y = -3 - 2x$.

| | | | | |
|-----|-----|----|----|----|
| x | -1 | 0 | 1 | 2 |
| y | p | -3 | -5 | -7 |

- (a) Find the value of p . [1]
- (b) Using a scale of 2 cm to represent 1 unit on both axes, draw the graph of $y = -3 - 2x$ for $-1 \leq x \leq 2$. [2]
- (c) From your graph, find the value of x when $y = -4.6$. [1]
- (d) Find the gradient of the line. [2]
- (e) (i) On the same axes, draw and label the line $y = -2$. [1]
- (ii) Write down the coordinates of the point where the line $y = -2$ meets the line $y = -3 - 2x$. [1]

- 8 The diagram below shows a solid formed by removing a cone and a hemisphere from the ends of a cylinder.



The base of the cylinder, the base of the cone and the base of the hemisphere have a common diameter of 6 cm. The height of the cone is 4 cm and the height of the cylinder is 12 cm.

- (a) Calculate the volume, in cm^3 , of the solid. [4]
- (b) Calculate the total surface area, in cm^2 , of the solid, leaving your answer in terms of π . [5]
- (d) A tube of acrylic paint can cover 36 cm^2 of the surface area of the solid. How many tubes of acrylic paint are needed to paint the entire solid? [2]

~ End of Paper ~

Answer Key

| Qn | Answer |
|----------|---|
| 1 (a) | $\frac{4b}{5a}$ |
| 1 (b) | $\frac{9-t}{6}$ |
| 2 (a) | $x \geq 3\frac{2}{3}$ |
| 2 (b) | [B1 – Correct position of $3\frac{2}{3}$ on number line, B1 – Correct shaded circle and direction of arrow] |
| 2 (c) | 4 |
| 3 (a) | $(3r-5)(2r+1)$ |
| 3 (b) | 4 and 7 |
| 4 (a) | $y(x-z)$ |
| 4 (b) | 9800 |
| 5 (a) | 6 |
| 5 (b) | 1 : 150000 |
| 5 (c) | 7.5 |
| 6 (a) | 135° |
| 6 (b) | 6.3 |
| 7 (a) | $6x-5$ |
| 7 (b) | $\frac{6x-5}{x-3} = 7$ |
| 7 (c) | 13 |
| 8 (a) | (6 , 2) |
| 8 (b) | Washroom |
| 8 (c) | Marked and labelled origin |
| 8 (d) | 7 |
| 8 (e) | 13.4 |
| 9 (a) | 4 |
| 9 (bi) | 24 |
| 9 (bii) | 21.5 |
| 9 (c) | $\frac{1}{4}$ |
| 10 (a) | 1 : 3 |
| 10 (ci) | 16.8 |
| 10 (cii) | 728 |

Answers:

| | |
|------|---|
| 1 | 100 |
| 2(a) | 3cm |
| (b) | 22° |
| (c) | 5.39 cm |
| 3(a) | \$16 x |
| (b) | 10 weeks |
| 4(a) | $f = \frac{7}{4}$ |
| (b) | $\frac{1}{4p(q-4)}$ |
| (c) | 5 |
| 5(c) | $a = 9, b = 8$ |
| (d) | 70% |
| 6(b) | $= \frac{1}{2}(2x^2 + 17x - 9)$ $= x^2 + \frac{17}{2}x - \frac{9}{2}$ |
| 8(a) | 245 cm ³ (3 s.f.) |
| (b) | 105 π |
| (c) | 10 tubes |



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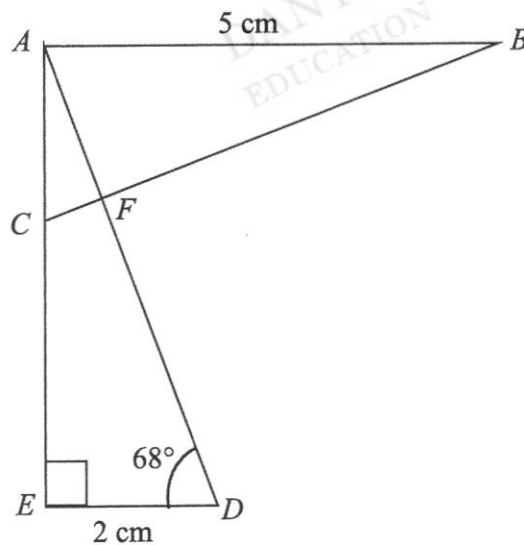
You must show your working clearly. [2]

$$\frac{3000 \times 1}{30} \quad \text{M1}$$

$$= 100 \quad \text{A1}$$

- 2 In the diagram, $\triangle ABC$ is congruent to $\triangle EAD$. Given that $AB = 5$ cm, $ED = 2$ cm, $\angle ADE = 68^\circ$, $\angle AED = 90^\circ$ and AD meets BC at F , find

- (a) the length of CE , [1]
 (b) $\angle ABC$, [2]
 (c) the length of BC , giving your answer to 3 significant figures. [2]



- (a) $CE = 5 - 2 = 3$ cm B1
- (b) $\angle ABC = 180 - 90 - 68$ M1
 $= 22^\circ$ A1
- (c) $BC^2 = 5^2 + 2^2$ M1
 $BC = 5.39$ cm (3s.f.) A1

- 3 Adrian needs to save at least \$147 before he has enough money to buy his grandmother a gift.

(a) Given that he saves \$16 every week, find an expression in terms of x , for the amount of money he will have in x weeks. [1]

(b) By forming an inequality in x and solving it, find the least number of weeks needed for Adrian to save up sufficient money to buy the gift. [2]

(a) $\$16x$ B1

(b) $16x \geq 147$ M1

$$x \geq 9.1875$$

He needs 10 weeks. A1

- 4 (a) Solve the equation $1 - \frac{2f-3}{2} = \frac{f+2}{5}$. [3]

(b) Simplify $\frac{2p-3}{(q-4)^3} \div \frac{8p^2-12q}{(q-4)^2}$, giving your answer as a single fraction in its lowest terms. [3]

(c) Given that $2a^2 - 2b^2 = 70$ and $a - b = 7$, find the value of $a + b$. [3]

(a) $1 - \frac{2f-3}{2} = \frac{f+2}{5}$

$$10 - 5(2f - 3) = 2(f + 2) \quad \text{M1 (simplify fractions)}$$

$$10 - 10f + 15 = 2f + 4$$

$$10 + 15 - 4 = 2f + 10f \quad \text{M1}$$

$$21 = 12f$$

$$f = \frac{7}{4} \quad \text{A1}$$

$$(b) \quad \frac{2p-3}{(q-4)^3} \div \frac{8p^2-12q}{(q-4)^2}$$

$$\frac{2p-3}{(q-4)^3} \times \frac{(q-4)^2}{8p^2-12q}$$

M1 (to flip)

$$\frac{2p-3}{(q-4)^3} \times \frac{(q-4)^2}{4p(2p-3)}$$

M1 (to factorize)

$$\frac{1}{4p(q-4)}$$

A1

$$(c) \quad 2a^2 - 2b^2 = 70$$

$$a^2 - b^2 = 35$$

M1

$$(a-b)(a+b) = 35$$

M1

$$\text{since } (a-b) = 7$$

$$a+b = 5$$

A1

- 5 A survey was conducted among 50 families to find out the number of times they travelled together as a family in 2017. The data collected is shown in the table below.

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- (c) Solve the two equations in (a) and (b) simultaneously. [2]
- (d) Find the percentage of families that travelled at most 2 times. [2]

(a) $50 - 15 - 11 - 7 = a + b$ B1

$$17 = a + b \text{ (shown)}$$

(b) $mean = \frac{0 \times 15 + a + 2 \times 11 + 3 \times 7 + 4b}{50}$

$$1.68 = \frac{a + 22 + 21 + 4b}{50} \quad \text{M1}$$

$$84 = a + 4b + 43$$

$$41 = a + 4b \text{ (shown)} \quad \text{A1}$$

(c) $a + b = 17$ eq 1

$$a + 4b = 41 \quad \text{eq 2}$$

$$4b - b = 41 - 17$$

$$\text{eq 2} - \text{eq 1} \quad 3b = 24 \quad \text{M1}$$

$$b = 8$$

sub $b = 8$ into eq 1

$$a + 8 = 17$$

$$a = 9$$

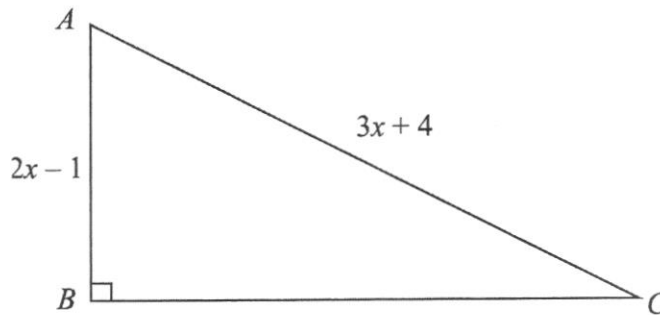
A1 for both answers correct

(d) no. of families at most 2 = 15 + 9 + 11 = 35

$$\frac{35}{50} \times 100\% \quad \text{M1}$$

$$= 70\% \quad \text{A1}$$

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$$(a) \quad (3x + 4)^2 = (2x - 1)^2 + (x + 9)^2 \quad \text{M1}$$

$$9x^2 + 24x + 16 = 4x^2 - 4x + 1 + x^2 + 18x + 81 \quad \text{M1}$$

$$4x^2 + 10x - 66 = 0$$

$$2x^2 + 5x - 33 = 0 \text{ (shown)} \quad \text{A1}$$

$$(b) \quad \frac{1}{2}(x + 9)(2x - 1) \quad \text{M1}$$

$$= \frac{1}{2}(2x^2 + 17x - 9) \quad \text{A1}$$

$$= x^2 + \frac{17}{2}x - \frac{9}{2}$$

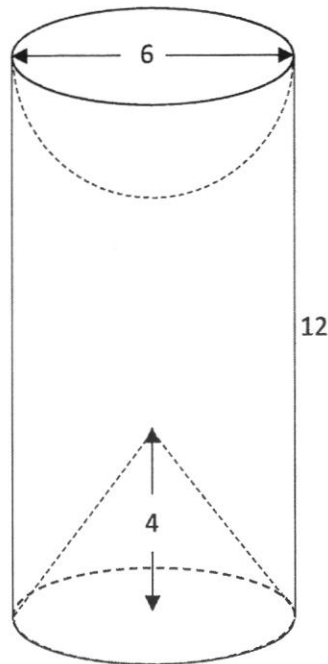
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- 8 The diagram shows a solid formed by removing a cone and a hemisphere from a cylinder.



The base of the cylinder, the base of the cone and the base of the hemisphere have a common diameter of 6 cm. The height of the cone is 4 cm and the height of the cylinder is 12 cm.

- (a) Calculate the volume in cm^3 of the solid. [4]
- (b) Calculate the total surface area in cm^2 of the solid, leaving your answer in terms of π . [4]
- (d) A tube of acrylic paint can cover 36 cm^2 of the surface area of the solid. How many tubes of acrylic paint are needed to paint the entire solid? [2]

- (a) Volume of hemisphere

$$= \frac{2}{3} \pi r^3$$

$$= \frac{2}{3} \pi 3^3$$

M1

$$= 18\pi$$

Volume of cone

$$\begin{aligned}
 &= \frac{1}{3} \pi r^2 h \\
 &= \frac{1}{3} \pi 3^2 (3) && \text{M1} \\
 &= 12\pi
 \end{aligned}$$

Volume of cylinder

$$\begin{aligned}
 &= \pi r^2 h \\
 &= \pi 3^2 (12) && \text{M1} \\
 &= 108\pi
 \end{aligned}$$

$$\begin{aligned}
 \text{Volume of the solid} &= 108\pi - 12\pi - 18\pi \\
 &= 245.044227 \\
 &= 245 \text{ cm}^3 \text{ (3 s.f.)}
 \end{aligned}$$

(b) curved surface area of hemisphere

$$\begin{aligned}
 &= 2\pi r^2 \\
 &= 2\pi 3^2 && \text{M1} \\
 &= 18\pi
 \end{aligned}$$

$$\begin{aligned}
 \text{Slanted height} &= \sqrt{4^2 + 3^2} \\
 &= 5
 \end{aligned}$$

curved surface area of cone

M1 either one or both

$$\begin{aligned}
 &= \pi r l \\
 &= \pi (3)(5) \\
 &= 15\pi
 \end{aligned}$$

curved surface area of cylinder

$$\begin{aligned}
 &= 2\pi r h \\
 &= 2\pi (3)(12) && \text{M1} \\
 &= 72\pi
 \end{aligned}$$

total surface area = $18\pi + 15\pi + 72\pi$

$$\begin{aligned}
 &= 105\pi && \text{A1}
 \end{aligned}$$

(c) no. of tubes needed

$$= \frac{105\pi}{36}$$

$$= 9.162978573$$

$$= 10 \text{ tubes}$$

M1

A1

~ End of Paper ~

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DURATION : 1 hour 15 minutes

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You are expected to use a scientific calculator to evaluate explicit numerical expressions.

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 number of marks for this paper is **50**.

| |
|---------------------------|
| For Examiner's Use |
| 50 |

This paper consists of 10 printed pages (including this cover page)

[Turn over

1 Simplify

(a) $\frac{8ab^2}{10a^2b}$

Answer (a) $\frac{4b}{5a}$ [B1] [1]

(b) $\frac{3(t+1)}{2} - \frac{5t}{3}$
 $\frac{3(t+1)}{2} - \frac{5t}{3} = \frac{9(t+1) - 10t}{6}$ [M1]
 $= \frac{9-t}{6}$ [A1]

Answer (b) $\frac{9-t}{6}$ [2]

2 (a) Solve the inequality $16 - 3x \leq 5$.

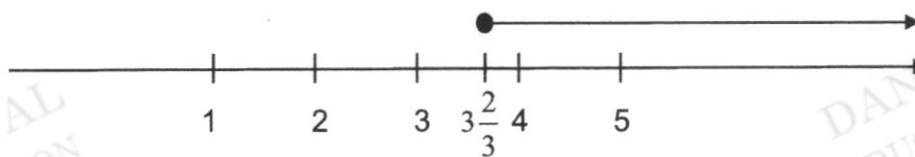
$16 - 3x \leq 5$

$-3x \leq -11$ [M1]

$x \geq 3\frac{2}{3}$ [A1]

Answer (a) $x \geq 3\frac{2}{3}$ [2]

(b) Draw a number line to represent the solution of the inequality found in (a).

[B1 – Correct position of $3\frac{2}{3}$ on number line, B1 – Correct shaded circle and direction of arrow] [2](c) Hence, state the minimum integer value of x .

Answer (c) 4 [B1] [1]

- 3 (a) Factorise $6r^2 - 7r - 5$.

| | | |
|----|-----------------|----|
| x | 2r | 1 |
| 3r | 6r ² | 3r |
| -5 | -10r | -5 |

Accept any other working
[M1]

Answer (a) $(3r-5)(2r+1)$ [A1] or [B2] [2]

- (b) Given that $r = 3$, evaluate the factors found in part (a).

Answer (b) 4 [B1] and 7 [B1] [2]

- 4 (a) Factorise $y(x-z)$.

Answer (a) $y(x-z)$ [B1] [1]

- (b) Hence, evaluate $143 \times 98 - 98 \times 43$, without the use of a calculator.

$$\begin{aligned} & 143 \times 98 - 98 \times 43 \\ & = 98(143 - 43) \quad [\text{M1}] \\ & = 9800 \quad [\text{A1}] \end{aligned}$$

Answer (b) 9800 [2]

[Turn over

5 An area of 4 cm^2 on a map represents an actual area of 9 km^2 .

- (a) If the actual area of a theme park is 13.5 km^2 , find the area of the theme park on the map, in cm^2 .

$$\frac{13.5}{9} \times 4 = 6$$

[M1]

Answer (a) 6 [A1] cm^2 [2]

- (b) Find the scale of the map in the form $1 : r$.

Map area : Actual area
 4 cm^2 : 9 km^2

Map distance : Actual distance

2 cm : 3 km [M1]

1 cm : 1.5 km

1 cm : 150000 cm

1 : 150000 [A1]

Answer (b) 1 : 150000 [2]

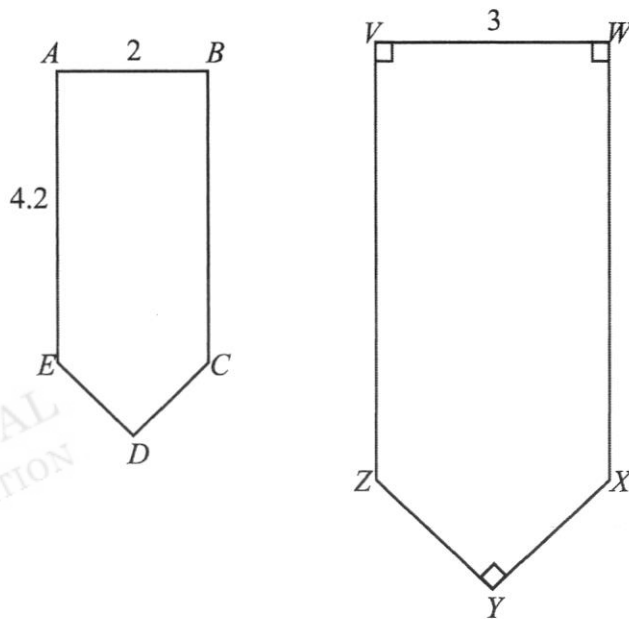
- (c) If the distance between two buildings on the map is 5 cm , calculate the actual distance between the two buildings in km .

$$\frac{5}{2} \times 3 = 7.5$$

[M1] [A1]

Answer (c) 7.5 km [2]

- 6 In the diagram below, pentagons $ABCDE$ and $VWXYZ$ are similar. $AB = 2$ cm, $AE = BC = 4.2$ cm, $VW = 3$ cm, $\angle ZVW = \angle VWX = \angle XYZ = 90^\circ$ and $XY = YZ$.



Find

- (a) $\angle VZY$,

Sum of interior angles in a polygon

$$= (5 - 2) \times 180^\circ$$

$$= 540^\circ \quad [\text{M1}]$$

$\angle VZY$

$$= \frac{540^\circ - 90^\circ \times 3}{2}$$

$$= 135^\circ \quad [\text{A1}]$$

Answer (a) 135° [2]

- (b) the length of WX .

$$\frac{3}{2} \times 4.2 \quad [\text{M1}]$$

$$= 6.3 \quad [\text{A1}]$$

Answer (b) 6.3 cm [2]

[Turn over

- 7 Elle wanted to organise a party for x number of people. She bought one cup of ice cream per person, and a total of $(2x+10)$ chicken wings and $(3x-15)$ fishballs.

- (a) Write an expression in terms of x , for the total number of items Elle bought for the party. Simplify your answer.

$$2x+10+3x-15+x=6x-5$$

Answer (a) 6x-5 [B1] [1]

- (b) 3 people did not attend the party. Elle distributed the items equally among the people at the party and found that each of them received 7 items.

- (i) Using the information provided, form an algebraic equation in terms of x .

$$\frac{6x-5}{x-3} = 7 \quad [\text{B1}]$$

Answer (b)(i) $\frac{6x-5}{x-3} = 7$ [B1] [1]

- (ii) Solve the equation in (b)(i) and find the number of people who attended the party.

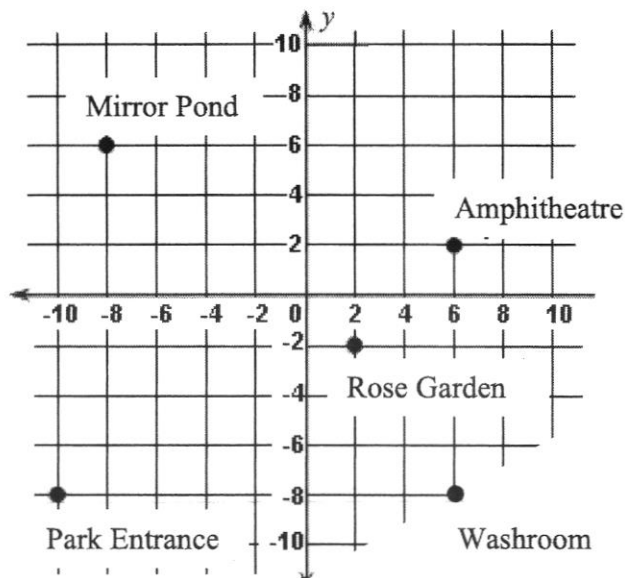
$$6x-5=7x-21 \quad [\text{M1}]$$

$$x=16 \quad [\text{M1}]$$

$$16-3=13 \quad [\text{A1}]$$

Answer (b)(ii) 13 [3]

- 8 The Cartesian coordinate plane below shows the positions of four locations in a park.



- (a) Write down the coordinates of the Amphiatre.

Answer (a) (6 , 2) [B1] [1]

- (b) Write down the name of the place at (6, -8).

Answer (b) Washroom [B1] [1]

- (c) Mark the origin on the given axes. Label the origin O .

[1]

- (d) Calculate the gradient of the line formed between the coordinates representing the Park Entrance and the Mirror Pond.

Answer (d) 7 [B1] [1]

- (e) Roy is standing at the Park Entrance. He wants to visit the Rose Garden. Calculate the shortest distance (in units) that he would need to walk.

$$\begin{aligned} & \sqrt{12^2 + 6^2} && \text{[M1]} \\ & = 13.4 \text{ units} && \text{[A1]} \end{aligned}$$

Answer (e) 13.4 [2]

- 9 The total number of hours spent using the computer in a week by 12 students are shown in the stem-and-leaf diagram below.

| Stem | Leaf |
|------|-------------|
| 0 | 8 |
| 1 | 2 4 4 k 8 |
| 2 | 5 5 |
| 3 | 0 8 |
| 4 | 1 9 |

Key: 1 | 2 means 12 hours

- (a) Given that the mode is 14 hours, find the value of k .

Answer (a) 4 [B1] [1]

- (b) Find
(i) the mean number of hours,

$$\frac{8+12+14+14+14+18+25+25+30+38+41+49}{12} \quad [\text{M1}]$$

$$=24 \quad [\text{A1}]$$

Answer (b)(i) 24 hours [2]

- (ii) the median number of hours.

$$\frac{18+25}{2}$$

$$=21.5 \quad [\text{B1}]$$

Answer (b)(ii) 21.5 hours [1]

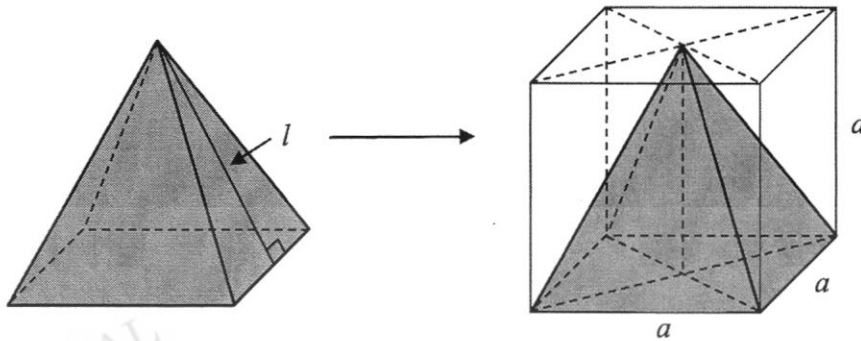
- (c) A teacher selects one student at random to do a project on cyber wellness. Calculate the probability that the student selected spent more than 35 hours using the computer in that week.

$$\frac{3}{12} \quad [\text{M1}]$$

$$=\frac{1}{4} \quad [\text{A1}]$$

Answer (c) $\frac{1}{4}$ [2]

- 10 A solid square pyramid toy, which has a slant height l cm, fits exactly into a cubic gift box, measuring a cm by a cm by a cm, as shown in the diagram.



- (a) State the ratio of the volume of the pyramid toy to the volume of the cubic gift box.

Answer (a) 1 : 3 [B1] [1]

- (b) Given that the volume of the pyramid toy is 1125 cm^3 , show that the value of a is 15.

$$\frac{1}{3}a^3 = 1125 \text{ [M1]}$$

$$a^3 = 3375$$

$$a = 15 \text{ (shown) [A1]}$$

[2]

[Turn over

- (c) (i) Calculate the slant height, l cm, of the pyramid toy.

$$\begin{aligned} & \sqrt{15^2 + 7.5^2} \quad [\text{M1}] \\ & = \sqrt{281.25} \\ & = 16.8 \quad [\text{A1}] \end{aligned}$$

Answer (c)(i) 16.8 cm [2]

- (ii) Calculate the total surface area of the pyramid toy.

$$\begin{aligned} & \text{Total surface area of pyramid toy} \\ & = (15 \times 15) \quad [\text{M1}] + 4\left(\frac{1}{2} \times 15 \times \sqrt{281.25}\right) \quad [\text{M1 - ECF}] \\ & = 728 \text{ cm}^2 \quad (3 \text{ s.f.}) \quad [\text{A1}] \end{aligned}$$

Answer (c)(ii) 728 cm² [3]

End of paper ☺