WOODLANDS RING SECONDARY SCHOOL

Name : _____ Reg No. ____ Class : _____

EXAMINATION	:	**END-OF-YEAR EXAMINATION**	
LEVEL	:	**SECONDARY 2 NORMAL ACADEMIC**	**DATE: 05 Oct 2018**
SUBJECT	:	**MATHEMATICS**	**PAPER: 1**
DURATION	:	**1 hour 15 minutes**	**MAX MARKS: 50**
SETTER(S)	:	**Mr Ong Chee Lim**	**Parent's/Guardian's Signature:**

READ THESE INSTRUCTONS FIRST

Write your name, class and register number on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.
The number of marks is given in brackets [ ] at the end of each question or part question.
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.

For Examiner's Use	
Strand	Marks
1. **Arithmetic** (Questions 1, 2, 3, 9, 10)	/ 13
2. **Statistics and Probability** (Questions 15)	/ 6
3. **Algebra** (Questions 4, 7, 11)	/ 9
4. **Geometry and Mensuration** (Question 5, 6, 8, 12, 13, 14)	/ 22
TOTAL MARKS	50

Answer ALL questions.

1 **(a)** Calculate $\dfrac{\sqrt{49.04}\times 5.01}{7.02-\sqrt{6.99}}$.

Write down the first five digits on your calculator display.

Answer ..... [1]

(b) Write your answer to part (a) correct to 2 decimal places.

Answer ..... [1]

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2 **(a)** Express 40 as the product of its prime factors.

Answer ..... [1]

(b) Find the highest common factor of 40 and 56.

Answer ..... [1]

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3 The first four terms of a sequence are 5, 10, 15 and 20.

(a) Write down the 7th term of the sequence.

Answer ..... [1]

(b) Find an expression, in terms of n, for the nth term of the sequence.

Answer ..... [1]

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4 Solve $37+5m-2m=79$.

Answer $m =$ ..... [2]

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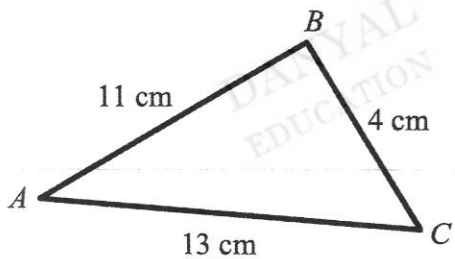
5 Use Pythagoras' Theorem to decide whether triangle ABC shown in the figure below is a right-angled triangle.



Answer .....

..... [2]

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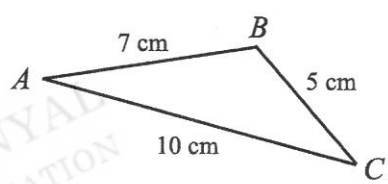
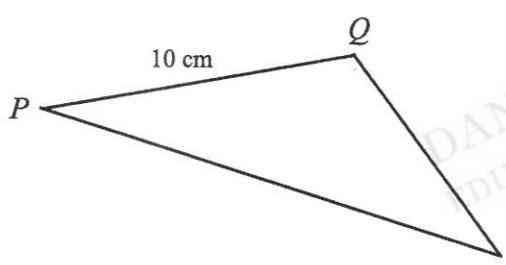
6 Triangle ABC and triangle PQR are similar.
Find RQ.





Answer $RQ =$ ..... cm [2]

---

7 Find x and y in the given simultaneous equations below.

$$3x - y = 7$$
$$x + y = 1$$

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

---

8 **(a)** Express $\frac{3}{8}$ as a percentage.

Answer ..... % [1]

(b) A toy store is having its annual sale.
After a 40% discount, a jigsaw puzzle is sold at \$36.
Determine the price of the jigsaw puzzle before this discount.

Answer \$ ..... [2]

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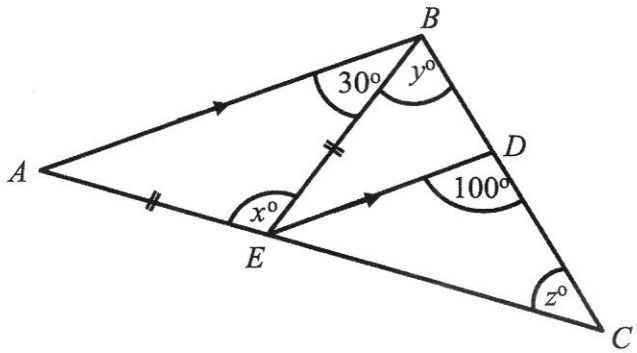
9 In the diagram, BDC and AEC are straight lines. AB is parallel to ED and $AE = BE$.
Angle $ABE = 30°$ and angle $EDC = 100°$.



Find the values of

(a) x,

Answer ..... [1]

(b) y,

Answer ..... [2]

(c) z.

Answer ..... [1]

10 **(a)**

Strawberry Shortbread Biscuit Recipe
100 g flour
75 g butter
50 g sugar
A few drops of strawberry essence
Makes 12 biscuits

Hafiz wants to make 90 strawberry shortbread biscuits. How many grams of sugar will he use?

Answer ..... g [2]

(b) A car is travelling at a constant speed of 72 km/h. Find how many minutes the car takes to travel 126 km.

Answer ..... minutes [2]

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11 Simplify

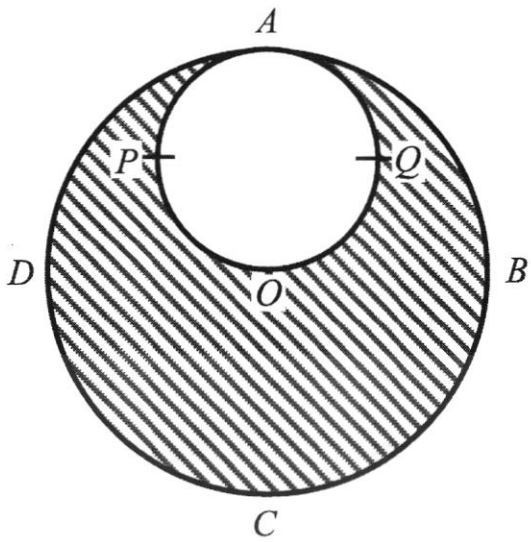
(a) $\frac{2x^3}{3} \times \frac{9}{6x}$

Answer ..... [2]

(b) $6a^2 \div \frac{2a}{b}$

Answer ..... [2]

12



ABCD is a circle of radius 8 cm, centre *O*. *AO* is a diameter of circle *APOQ*.

(a) Write down the radius of circle *APOQ*.

Answer ..... cm [1]

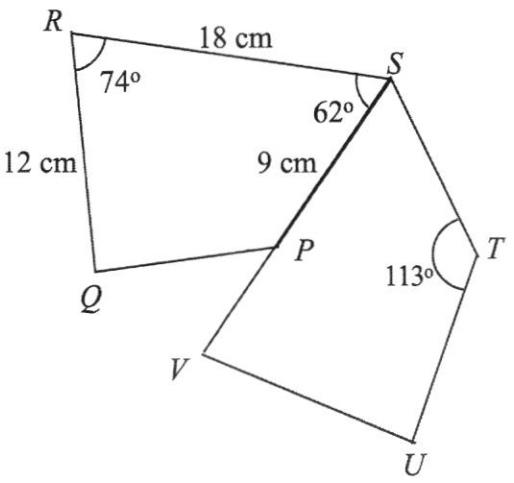
(b) Calculate the circumference of circle *APOQ*.

Answer ..... cm [1]

(c) Calculate the area of the shaded region, giving your answer in terms of π.

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

13



In the diagram shown above, quadrilateral $PQRS$ is congruent to quadrilateral $TUVS$.
$\angle STU = 113°$, $RS = 18$ cm, $QR = 12$ cm, $PS = 9$ cm, $\angle PSR = 62°$ and $\angle QRS = 74°$.
Find

(a) the length of SV,

Answer ..... cm [1]

(b) $\angle PQR$

Answer ..... ° [2]

(c) $\angle QPV$

Answer ..... ° [1]

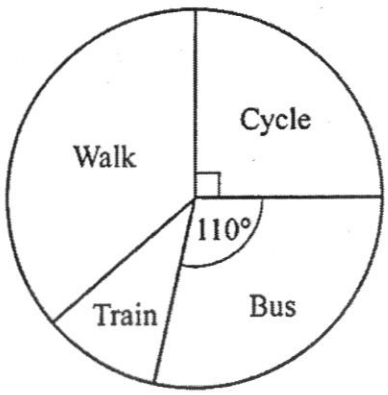
14 In triangle PQR, $PQ = 10$ cm and $\angle PQR = 70°$.

(a) Using the line QR already given below, construct triangle PQR. [2]

(b) Construct the perpendicular bisector of QR. [2]

(c) Construct the angle bisector of $\angle PQR$. [2]

15 **(a)** The pie chart below shows how the students in another school travelled to school



330 students travelled by bus.

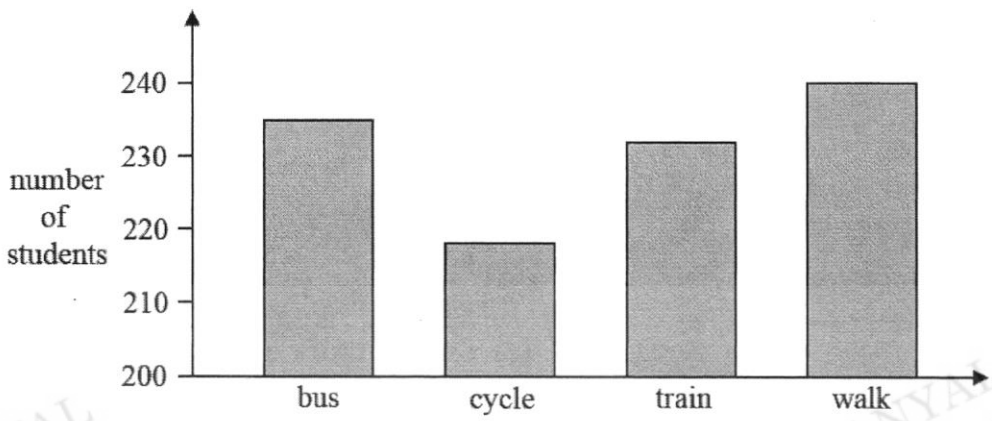
(i) Calculate the number of students who cycled to school.

Answer ..... [2]

(ii) Three times as many students walked to school as those who travelled by trains.
Calculate the number of students who walked to school.

Answer ..... [3]

(b) The bar chart shows how the students in West Region School travelled to school.



James says, "The number of students travelling by bus to school is about twice the number of students cycling." Is James correct? Explain your answer.

Answer .....

..... [1]

[END OF PAPER]

WOODLANDS RING SECONDARY SCHOOL

Name : _____ Reg No. ____ Class : _____

EXAMINATION : END-OF-YEAR EXAMINATION
LEVEL : SECONDARY 2 NORMAL ACADEMIC **DATE: 08 Oct 2018**
SUBJECT : MATHEMATICS **PAPER: 2**
DURATION : 1 hour 15 minutes **MAX MARKS: 50**
SETTER(S) : Mr John Toh **Parent's/Guardian's Signature:**

READ THESE INSTRUCTONS FIRST

Write your name, class and register number on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
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The number of marks is given in brackets [ ] at the end of each question or part question.
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For Examiner's Use	
Strand	Marks
1. **Arithmetic** (Questions 9, 10)	/ 14
2. **Statistics and Probability** (Questions 1, 5)	/ 8
3. **Algebra** (Questions 2, 3, 8)	/ 13
4. **Geometry and Mensuration** (Question 4, 6, 7)	/ 15
TOTAL MARKS	50

Mathematical Formulae

Mensuration

Surface area of a cone = $\pi rl + \pi r^2$

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

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

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

Statistics

Mean = $\frac{\Sigma fx}{\Sigma f}$

1 A bag contains 16 red balls, 7 green balls and 8 blue balls. A ball is picked at random.

Find the probability that the ball that is picked is

(a) white in colour,

Answer ..... [1]

(b) red in colour,

Answer ..... [1]

(c) either red, green or blue in colour.

Answer ..... [1]

---

2 **(a)** Solve the inequality $3x - 2 > 16$.

Answer ..... [2]

(b) Write down the smallest integer value of x which satisfies the above inequality.

Answer ..... [1]

---

3 Factorise each of the following expressions completely.

(a) $y^2 + 12y - 13$

Answer ..... [2]

(b) $4x^2 - 100$

Answer ..... [2]

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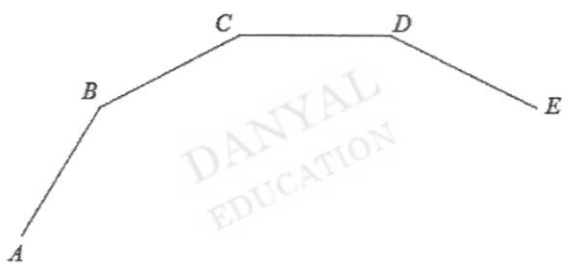
4 The diagram (not drawn to scale) shows part of a regular 16-sided polygon.



Calculate

(a) $\angle BCD$,

Answer .....° [2]

(b) the size of one exterior angle.

Answer .....° [2]

---

5 The following is a stem and leaf diagram of the marks obtained by students in an English Language class test marked out of a total of 80 marks.

Stem	Leaf
2	0 1 7
3	3 4 4 4
4	2
5	1 8 9
6	2 2 3 4

Key: 2|0 means 20

Find

(a) the number of students who took the test,

Answer ..... students [1]

(b) the modal score,

Answer ..... marks [1]

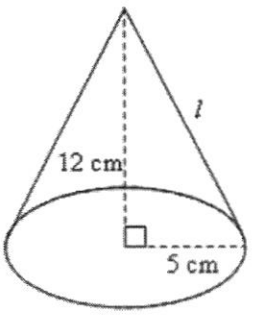
(c) the median score,

Answer ..... marks [1]

(d) the mean score.

Answer ..... marks [2]

6 The diagram below shows a circular solid cone with base radius 5 cm and height 12 cm.



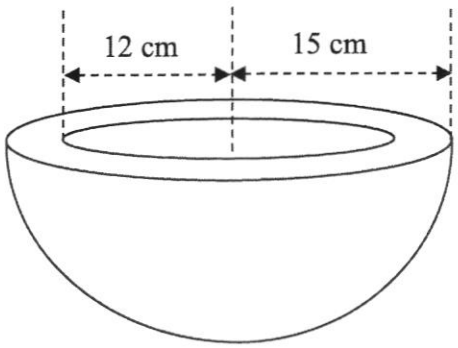
(a) Find the length of the slant height l.

Answer $l =$ ..... cm [2]

(b) Find the total surface area of the cone.
(Take $\pi = 3.142$, and leave your answers in 3 significant figures)

Answer ..... cm^2 [3]

7 A company wants to manufacture hollow hemispheric containers for sale.
Each container has an external radius of 15 cm and an internal radius 12 cm, as shown in the diagram below.



(a) Taking $\pi = 3.142$, find the volume of the material that is needed to make each container. Leave your answer correct to 3 significant figures.

Answer ..... cm^3 [3]

(b) The company is evaluating 3 types of materials, *X*, *Y* and *Z* for manufacturing the container. The cost of each type of material is shown in the table below.

Material	*X*	*Y*	*Z*
Cost ($/cm^3)	0.0014	0.0021	0.0025

If the company wants the cost of each container to be less than $15, determine the material/s suitable for making the containers.

Answer ..... [3]

8 Mr Ang is x years old this year. Mr Beh is twice as old as Mr Ang.
Mr Cheng is 3 years older than Mr Beh.

(a) Express Mr Beh's age in terms of x.

Answer ..... years old [1]

(b) Express Mr Cheng's age in terms of x.

Answer ..... years old [1]

(c) If the sum of the 3 men's ages is 128, form an equation in terms of x and show that it reduces to $5x+3=128$. [2]

(d) Solve the equation $5x+3=128$ to find Mr Ang's age.

Answer ..... years old [2]

9 **(a)** It is given that y is inversely proportional to x^2, and that $y = 80$ when $x = 4$.

(i) Find the equation connecting y and x.

Answer ..... [2]

(ii) Hence, find the value of y when $x = -7$.

Answer ..... [1]

(b) On a map, the distance between two towns is 3 cm when the actual distance between the two towns is 12 km.

Find

(i) the scale of the map in $1 : n$,

Answer ..... [2]

(ii) the actual area of a town, in km^2, when it has an area of 2 cm^2 on the map.

Answer ..... km^2 [2]

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

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

x	-3	0	1	3
y	-7	p	q	11

(a) Find the values p and q. [1]

(b) Using a scale of 2 cm to 1 unit on the x-axis, and 1 cm to 1 unit on the y-axis, draw the graph of $y = 3x + 2$ for $-3 \leq x \leq 3$. [2]

(c) From the graph that you have drawn in **(b)**, find the gradient of the line $y = 3x + 2$. [2]

(d) The point $(-1, k)$ lies on the graph. Determine the value of k. [1]

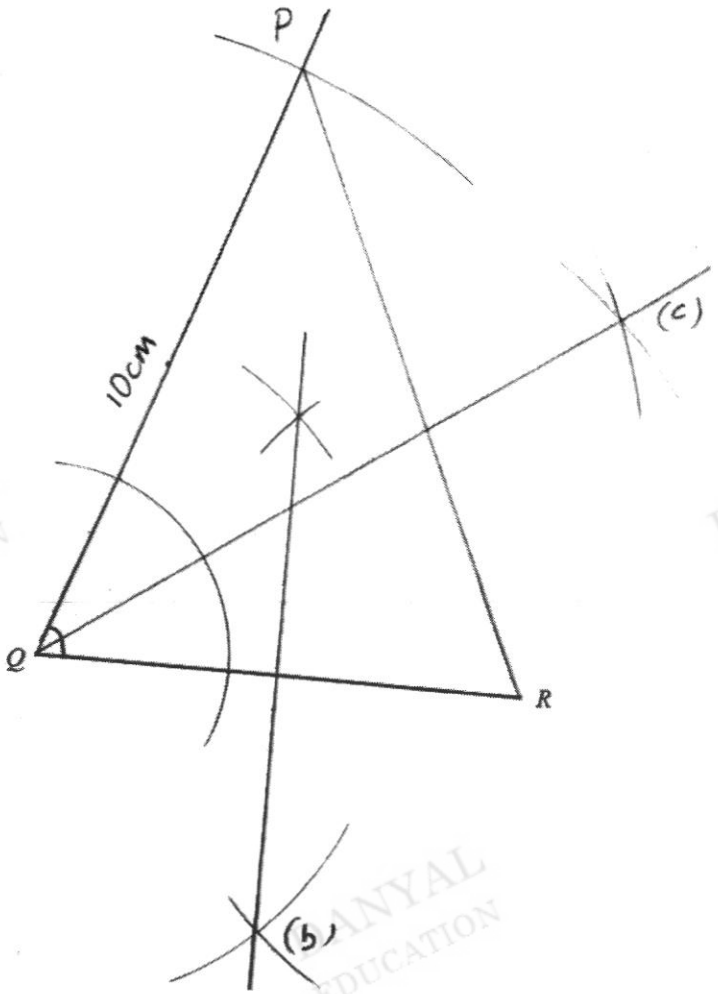
(e) State the x-intercept of the graph. [1]

[END OF PAPER]

1(a)	$\frac{\sqrt{49.04}\times 5.01}{7.02-\sqrt{6.99}} = 8.0171$	B1
(b)	8.02 (2 d.p.)	B1
2(a)	$40 = 2^3\times 5$ **or** $2\times 2\times 2\times 5$	B1
(b)	$56 = 2^3$ x 7 HCF of 40 and $56 = 2^3 = 8$	 A1
3(a)	$T_7 = 35$	B1
(b)	$T_n = 5n$	B1
4	$37+5m-2m=79$ $3m = 79 - 37$ $3m = 42$ $m = 14$	 M1 A1
5	In ΔABC, AB is the longest side. $AB^2 = 13^2$ $= 169$ $BC^2 + CA^2 = 11^2 + 4^2$ $= 137$ $\therefore\ AB^2 \neq BC^2 + CA^2$ Hence, ΔABC is not a right-angled triangle.	 M1 A1
6	$\frac{RQ}{CB} = \frac{PQ}{AB}$ $\frac{RQ}{5} = \frac{10}{7}$ $RQ = \frac{(10)(5)}{7}$ $= 7\frac{1}{7}cm$	 M1 A1

7	$3x - y = 7 \quad -(1)$ $x + y = 1 \quad -(2)$ $(1)+(2),\ (3x-y)+(x+y) = 7+1$ $4x = 8$ $x = 2$ Substitute $x = 2$ into (2), $(2) + y = 1$ $y = -1$ Therefore, the solution is $x = 2$ and $y = -1$.	M1 A1 A1
8(a)	$\frac{3}{8} = 37.5\%$	A1
(b)	(a) 60% corresponds to \$36 monetary value 1% corresponds to \$0.60 100% corresponds to \$60 Price before discount = \$60	M1 A1
9(a)	$x = 180 - 30 - 30$ (angle sum of triangle) $= 120$	A1
(b)	Angle $ABD = 100^\circ$ (int angle, AB // ED) $y = 100 - 30$ $= 70$	M1 A1
(c)	$z = 180 - 100 - 30$ (angle sum of triangle) $= 50$	A1
10(a)	$\frac{90}{12} \times 50$ = 375 g	M1 A1
(b)	$time = \frac{distance}{speed} = \frac{126}{72} \times 60\ min$ =105 minutes	M1 A1

11(a)	$\frac{2x^3}{3} \times \frac{9}{6x} = \frac{(2x^3)(9)}{(3)(6x)}$ $= \frac{(2xxx)(9)}{(3)(6x)}$ $= \frac{x^2}{1}$ $= x^2$	M1 A1
(b)	$6a^2 \div \frac{2a}{b} = 6a^2 \times \frac{b}{2a}$ $= \frac{6a^2}{1} \times \frac{b}{2a}$ $= \frac{(6a^2)(b)}{(1)(2a)}$ $= \frac{3ab}{1}$ $= 3ab$	M1 A1
12(a)	4 cm	B1
(b)	Circumference = $2\pi(4)$ =25.1 cm or 25.136 cm	A1
(c)	area of circle $ABCD = 64\pi$ cm^2 area of circle $APOQ = 16\pi$ cm^2 Area of shaded region = $64\pi - 16\pi$ $= 48\pi$ cm^2	M1 A1
13(a)	$SV = SR$ $= 18$ cm	B1
(b)	Since $PQRS$ is congruent to $TUVS$, $\angle SPQ = \angle STU$ $= 113°$ Since the sum of angles in a quadrilateral is $360°$, $\angle PQR = 360° - \angle SPQ - \angle QRS - \angle RSP$ $= 360° - 113° - 74° - 62°$ $= 111°$	M1 A1
(c)	$\angle QPV = 180° - \angle SPQ$ $= 180° - 113°$ $= 67°$	M1 A1

14(a)	 **B1**: 10 cm length **B1**: 70° angle	
(b)	**M1**: working lines shown, correctly drawn **A1**: accuracy	
(c)	**M1**: working lines shown, correctly drawn **A1**: accuracy	

15(ai)	$\frac{330}{110} \times 90$ $=270$	M1 A1
(ii)	Angle for walk and train $= 360 - 90 - 110$ $= 160^o$ Angle for walk $= 160^\circ \times \frac{3}{4} = 120^\circ$ $\frac{330}{110} \times 120 = 360$	M1 M1 A1
15(b)	No, because the vertical axis does not start at 0 or figures given: compare 216 and 233	

WOODLANDS RING SECONDARY SCHOOL

ASSESSMENT : END-OF-YEAR EXAMINATION
LEVEL : SECONDARY 2 NORMAL ACADE **DATE: 08 Oct 2018**
SUBJECT : MATHEMATICS **PAPER: 2**
SETTER(S) : Mr John Toh

MARKING SCHEME

1. (a) 0 [B1]

(b) $\frac{16}{16+7+8} = \frac{16}{31}$ [B1]

(c) 1 [B1]

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2. (a) $3x-2>16$
$3x>16+2$ [M1]
$3x>18$
$x>6$ [A1]

(b) 7 [B1]

---

3. (a) $y^2+12y-13 = (y+13)(y-1)$ [B2] award one mark if only one of the two factors is correct.

(b) $4x^2-100 = 4(x^2-25)$ [M1]
$= 4(x+5)(x-5)$ [A1]

---

4. (a) Sum of interior angles $= (16-2)180°$
$= 2520°$ [M1]

$\angle BCD = 2520° \div 16$
$= 157.5°$ [A1]

(b) Exterior angle $= 360° \div 16$ [M1]
$= 22.5°$ [A1]

---

5. (a) total number of students = 15 students [B1]

(b) modal score = 34 marks [B1]

(c) median score = 42 marks [B1]

(d) Mean score

$$= \frac{20+21+27+33+34+34+34+42+51+58+59+62+62+63+64}{15}$$ [M1]

$$= \frac{664}{15}$$

$$= 44.3 \text{ or } 44\frac{4}{15}$$ [A1]

---

6. (a) $12^2 + 5^2 = l^2$ (Pythagroas' Theorem)

$144 + 25 = l^2$ [M1]

$l = \sqrt{169}$

$= 13$ [A1]

(b) Surface area

$= \pi(5)(13) + \pi(5)^2$ [M1]

$= 90\pi$ or 282.78 [M1]

$\approx 283 \text{ cm}^2$ (3sf) [A1]

Alternate method

Curved surface area $= \pi(5)(13)$

$= 204.23 \text{ cm}^2$ [M1]

Area of base $= \pi(5)^2$

$= 78.55 \text{ cm}^2$ [M1]

Total surface area $= 204.23 + 78.55$

$\approx 283 \text{ cm}^2$ (3sf) [A1]

---

7. (a) Volume of material needed

$= \frac{1}{2}\times\frac{4}{3}\pi(15)^3 - \frac{1}{2}\times\frac{4}{3}\pi(12)^3$ [M1]

$= 1098\pi$ [M1]

$= 3449.9 \text{ cm}^3$

$\approx 3450 \text{ cm}^3$ (3sf) [A1]

Alternate method

Volume of big hemisphere $= \frac{1}{2}\times\frac{4}{3}\pi(15)^3$

$= 7069.5 \text{ cm}^3$ [M1]

Volume of hollow $= \frac{1}{2}\times\frac{4}{3}\pi(12)^3$

$= 3619.6 \text{ cm}^3$ [M1]

Volume of material needed $= 7069.5 - 3619.6$

$= 3449.9 \text{ cm3}$

$\approx 3450 \text{ cm}^3$ (3sf) [A1]

(b) For material *X*,

cost $=$ \$0.0014×3449.9

$=$ \$4.83

For material *Y*,

cost $=$ \$0.0021×3449.9

$=$ \$7.24

For material *Z*,

cost $=$ \$0.0025×3449.9

$=$ \$8.62

All 3 materials *X*, *Y* and *Z* are suitable.

[M1] - for showing the correct steps of working for all 3.
[M1] - for getting the correct cost of all 3 types of materials using 5sf working.
[A1] - for deriving the correct conclusion based on calculated values.

8. (a) $2x$ years old [B1]

(b) $(2x+3)$ years old [B1]

(c) $x + 2x + (2x+3) = 128$ [M1] allows ecf
$5x + 3 = 128$ [A1]

(e) $5x + 3 = 128$
$5x = 128 - 3$ [M1]
$= 125$
$x = 25$

Mr Ang's age = 25 years old [A1]

---

9. (a)(i) Let $x^2 y = k$
$(4^2)80 = k$
$k = 1280$ [M1]
Hence, $x^2 y = 1280$ [A1]

(a)(ii) When $x = -7$,
$(-7)^2 y = 1280$
$y = 26\frac{6}{49}$ or 26.1 [B1]

(b)(i) 3 cm : 12 km = 1 cm : 4 km [M1]
= 1 cm : 4000 m
= 1 cm : 400 000 cm
= 1 : 400 000 [A1]

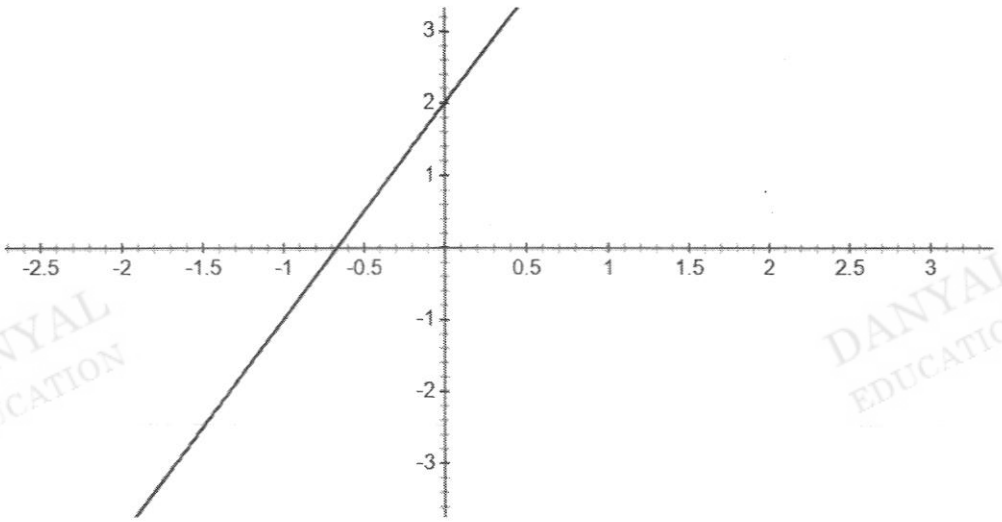
(b)(ii) 1 cm : 4 km
1 cm × 1 cm : 4 km × 4 km [M1]
1 cm^2 : 16 km^2
2 cm^2 : 32 km^2

Hence, actual area is 32 km^2 [A1]

---

10. (a) $p = 2$
$q = 5$ [A1]

(b) SP - Correct scale and all points plotted correctly [M1]
LA - Axes marked correctly, line drawn correctly to join the points [M1]



(c) Correct working on the graph to find gradient. [M1]
Gradient = 3 [A1]

(d) k = –1 (value must be obtained from graph) [B1]

(e) –0.6 or –0.7 [B1]