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Name	Index Number	Class
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WOODGROVE SECONDARY SCHOOL

N LEVEL PRELIMINARY EXAMINATION 2018

LEVEL & STREAM : SECONDARY 4 NORMAL ACADEMIC

SUBJECT (CODE) : ELEMENTARY MATHEMATICS (4045)

PAPER NO : 01

DATE / DAY : 16 August 2018 (Thursday)

DURATION : 2 Hours

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class on all the work you hand in.
 Write in dark blue or black pen.
 You may use a soft pencil for any diagrams, graphs, tables or rough working.
 Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your class, index number and name on the work you hand in.
 Write in dark blue or black pen on both sides of the 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 the loss of marks.
 The total number of marks for this paper is 80.

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 correct to three significant figures. Give answers in degrees to one decimal place.
 For π , use either your calculator value or 3.142.

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** the questions.

- 1 It is estimated that the population of Asia in 2020 will be 4.58 billion.

Express 4.58 billion in standard form.

Answer [1]

- 2 The total cost of an advertisement in a newspaper is obtained by adding together a fixed charge of \$5 and a charge of 15 cents per word

(a) Calculate the total cost of an advertisement containing 75 words.

Answer \$ [2]

(b) The total cost of an advertisement containing n words is C cents.

Write the formula for C in terms of n .

Answer [1]

- 3 Simplify

(a) $\left(\frac{2}{7}x^2\right)\left(\frac{1}{2}x^2\right),$

Answer [1]

(b) $\frac{2}{7}x^2 + \frac{1}{2}x^2.$

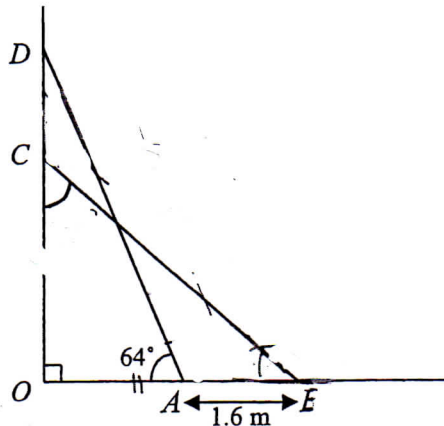
Answer [1]

4. Peter invests \$8500 in a bank which pays compound interest at a rate of 2.75% per annum.

Calculate the amount Peter has in the bank after 3 years.

Answer \$ [2]

A 5 metre ladder, AD , stands on horizontal ground at A and leans against a vertical wall at D . It makes an angle of 64° with the ground. The point O , on the ground, is vertically below D . The ladder slides down the wall to C . As a result, the base of the ladder moves a distance of 1.6 m from A to B .



Find the angle it now makes with the ground.

Answer ° [3]

- 6 Sharon paid \$368.60 for a digital camera.
This amount included the 7% Goods and Services Tax (GST).

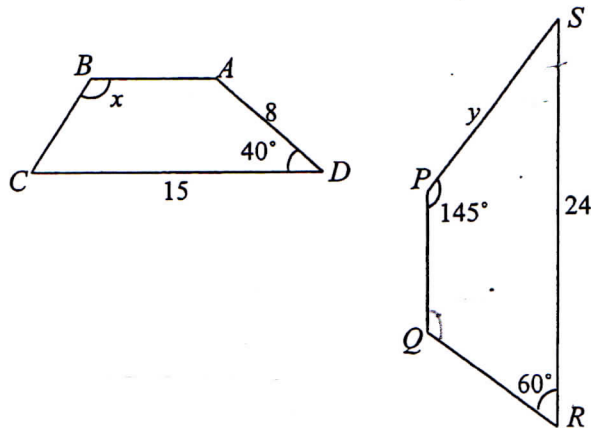
How much GST did Sharon pay?

Answer \$ [2]

- 7 (a) Quadrilateral $ABCD$ is similar to quadrilateral $PQRS$.

Find the values of x and y .

(All the lengths are in centimetres. The diagrams are not drawn to scale.)



Answer $x = \dots\dots\dots^\circ$ [1]

$y = \dots\dots\dots$ cm [1]

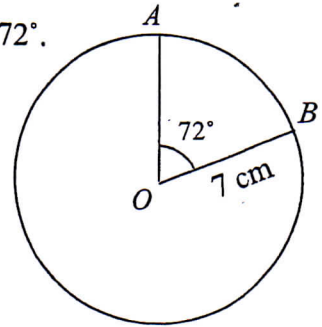
(b) Is quadrilateral $PQRS$ a trapezium? Explain why or why not.

Answer

[1]

- 8 A circle, centre O , has radius 7 cm.
 A and B are points on the circumference and angle $AOB = 72^\circ$.

Find the perimeter of the **minor sector** AOB .



Answer cm [2]

- 9 Ahmad either jogs, cycles or swims every Saturday.
 The probability that he jogs is $\frac{2}{5}$. The probability that he cycles is $\frac{1}{4}$.

(a) Write down the probability that he does not jog.

Answer [1]

(b) What is the probability that he swims?

Answer [1]

- 10 (a) Express the ratio of 72 minutes to 1.8 hours in its simplest form.

Answer : [1]

- (b) A plan is drawn to a scale of 1 : 125.

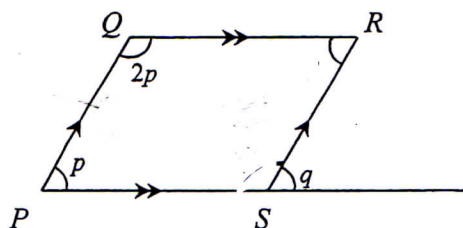
Find the actual length in metres, of a room which is 4.5 cm long on the plan.

Answer m [2]

- 11 $PQRS$ is a parallelogram.

Find the values of p and q .

You **must** show your working and state your reasons.



Answer $p =$ ° [1]

$q =$ ° [1]

- 12 For angle values between 0° and 180° , write down

(a) the value of x when $\cos x = -0.453$,

Answer $x = \dots\dots\dots^\circ$ [1]

(b) two values of y when $\sin y = 0.745$.

Answer $y = \dots\dots\dots^\circ$ or $\dots\dots\dots^\circ$ [2]

- 13 By rounding off each number to a value that is most appropriate, estimate, without the use of calculator, the value of

$$\frac{5.32 + \sqrt{9.59}}{\sqrt[3]{508}}$$

You must show your working.

Answer $\dots\dots\dots$ [2]

- 14 A car travels 256 km along an expressway in 3 hours 42 minutes.

Find the car's average speed in

(a) kilometres per hour.

Answer $\dots\dots\dots$ km/h [1]

(b) metres per second.

Answer $\dots\dots\dots$ m/s [2]

15

5, 8, 11, 14,

For the sequence shown above, find

(a) the next two terms,

Answer and [1]

(b) the n th term,

Answer [1]

(c) the 50th term.

Answer [1]

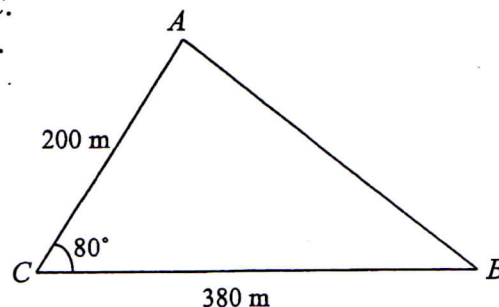
16

A vegetable field is in the shape of triangle ABC .
 $AC = 200$ m, $CB = 380$ m, and angle $ACB = 80^\circ$.

A farmer expects to harvest 2.5 kg of carrots from each square metre of field.

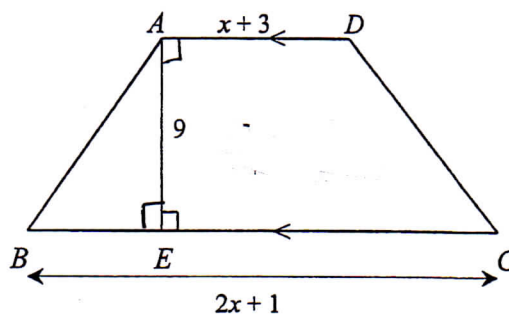
Find the mass of carrots he can harvest if he grows only carrots in the triangular field.

Express your answer in tonnes.



Answer tonnes [3]

- 17 Figure $ABCD$ below is a trapezium, where $AD = (x + 3)$ cm, $BC = (2x + 1)$ cm, $AE = 9$ cm and the area of the trapezium $ABCD$ is 108 cm^2 .



Find the value of x .

Answer cm [2]

- 18 A garden in a school is in the shape of a sector of a circle. On a plan drawing of the school, the length of the straight side of the garden is drawn to be 2 cm. On the actual ground, the length of this side of the garden is 10 m.

(a) Find the scale factor of the reduction represented on the plan drawing.

Answer [2]

(b) Show that the angle of the vertex of the sector is 1 rad if the curve side of the garden has the same length as the straight side.

Answer

[1]

(c) Hence, find the area of the actual garden.

Answer..... m^2 . [2]

19 The number 72, written as the product of its prime factors, is $2^3 \times 3^2$.

(a) Write 84 as the product of its prime factors.

Answer..... [1]

(b) Use the results of part (a) to find

(i) the highest common factor of 72 and 84,

Answer [1]

(ii) the lowest common multiple of 72 and 84,

Answer [1]

(iii) the smallest integer k such that $84k$ is a perfect square.

Answer [1]

- 20 (a) Write down the size of one exterior angle of a regular 10-sided polygon.

Answer ° [1]

- (b) Three angles in a hexagon are 110 each.

The size of the remaining three angles are in the ratio 2 : 5 : 6.

Find the smallest of these three angles.

Answer ° [3]

- 21 (a) Factorise $15x + 15$.

Answer [1]

- (b) Expand $(3x - 7)(2x + 5)$ and simplify your answer.

Answer [2]

- (c) Express the following as a single fraction in its simplest form.

$$\frac{3}{(y-2)} - \frac{4}{y}$$

Answer [2]

- 22 The stem-and-leaf diagram below shows the heights, in cm, of a group of boys and girls in a class.

Boys						Girls				
			4	2	13	8				
9	8	2	1	1	14	2	3	4	5	6
				1	15					
		9	8	2	16	2	3	3	3	3
				4	17	0	5			
Key (Boys)						Key (Girls)				
4 17 means 174						16 3 means 163				

- (a) How many boys are there in the class?

Answer [1]

- (b) Complete the cumulative frequency table using the data above.

Height of students, h	Cumulative frequency
$h \leq 140$	3
$h \leq 150$	
$h \leq 160$	
$h \leq 170$	
$h \leq 180$	

[2]

- (c) Find the percentage of students who are taller than 170 cm.

Answer % [2]

23 x is a positive number and y is a negative number.

(a) It is given that $0.5x < 21$.

Find the largest possible value of integer x .

Answer [1]

(b) The difference between x and y is 34.

Write down an equation relating x and y .

Answer [1]

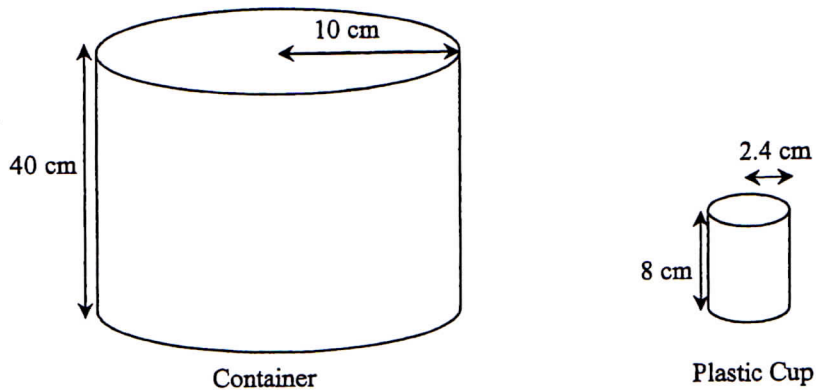
(c) It is also known that the sum of three times of x and seven times of y is 32.

Write down another equation and solve them simultaneously to find the two numbers.

Answer $x =$

$y =$ [4]

- 24 Orange juice is stored in a large cylindrical container. The radius of the container is 10 cm and its height is 40 cm.



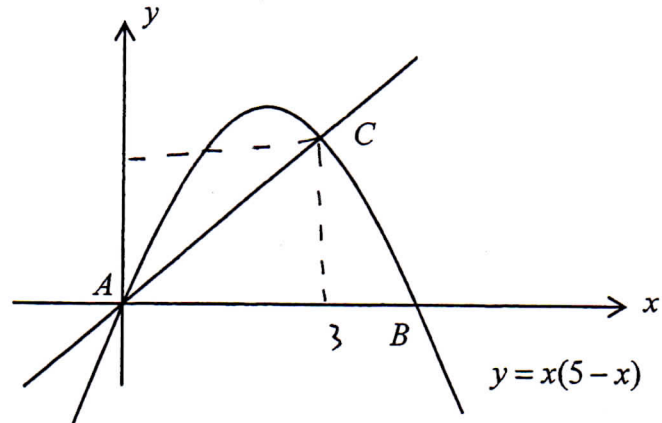
- (a) Find the volume of orange juice in the large container.
Express your answer in litres.

Answer litres [2]

- (b) All of the orange juice is used to fill cylindrical plastic cups with radius, 2.4 cm and height 8 cm.
What is the maximum number of cups that can be filled?

Answer cups [3]

- 25 The diagram shows the curve $y = x(5 - x)$ intersecting the x -axis at A and B . A straight line intersects the curve at C .



- (a) Find the coordinates of A and B .

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

B (.....,) [1]

- (b) Given that the x -coordinate of C is 3,

- (i) find the coordinates of C ,

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

- (ii) the length of AC .

Answer cm [2]

END OF PAPER

1	4.58×10^9	BI
2 a	$75 \times 0.15 = \$11.25$ Total cost = $5 + 11.25$ = \$16.25	M1 A1
b	$C = 500 + 15\pi$	BI
3 a	$\frac{x^4}{7}$	BI
b	$\frac{4x^2 + 7x^2}{14}$ $= \frac{11x^2}{14}$	M1 BI
4	Amount = $8500 \left(1 + \frac{2.75}{100} \right)^3$ = 9220.7111 = \$9220.71 (to nearest cent)	M1 A1
5	$\cos 64^\circ = \frac{OA}{5}$ $OA = 5 \times \cos 64^\circ = 2.1918 \text{ m}$ $OB = 2.1918 + 1.6 = 3.7918 \text{ m}$ $\cos \angle CBO = \frac{3.7918}{5}$ $\angle CBO = \cos^{-1} \left(\frac{3.7918}{5} \right)$ = 40.7° (1dp)	M1 M1 A1
6	$GST = \frac{7}{107} \times 368.60$ = 24.114 = \$24.11 (nearest cent)	M1 A1
7 a	$x = 360 - 145 - 60 - 40$ = 115° $\frac{y}{8} = \frac{24}{15}$ $y = 12.8 \text{ cm}$	BI BI

b	Not a trapezium. $\angle Q + \angle R = 115^\circ + 60^\circ \neq 180^\circ$	BI	Accept equivalent statements
8	Arc length $AB = \frac{72}{360} \times 2 \times \pi \times 7$ = 8.7965 cm Perimeter = $7 + 7 + 8.7965$ = 22.7965 cm = 22.8 cm (3sf)	M1 A1	
9 a	P(does not jog) = $1 - \frac{2}{5}$ = $\frac{3}{5}$	BI	
b	P(swims) = $1 - \frac{2}{5} - \frac{1}{4}$ = $\frac{7}{20}$	BI	
10 a	72 min : 1.8×60 min = 2 : 3	BI	
b	1 cm : 1.25 m 4.5 cm : 1.25×4.5 m = 5.625 m	M1 A1	
11	$2p + p = 180^\circ$ (Interior $\angle s$) $p = 60^\circ$ $p = q = 60^\circ$ (Corresponding $\angle s$)	Deduct 1 mark if any one reason not shown. BI BI	
12 a	$x = 116.9$	BI	
b	$y = 48.2,$ 131.8	BI BI	
13	$\frac{5 + \sqrt{9}}{\sqrt[3]{512}}$ = 1	M1	
14 a	Average Speed = $256 + 3 \frac{42}{60}$ = 69.189 = 69.2 km/h (3sf)	A1 BI	

$$\begin{aligned} \text{Ave Speed} &= \frac{256 \times 1000}{222 \times 60} \\ &= 19.219 \\ &= 19.2 \text{ m/s (3sf)} \end{aligned}$$

M1

15 a 17 and 20

BI

b $2+3n$

BI

c $2+3(50) = 152$

BI

16 Area of field = $\frac{1}{2}(200)(380)\sin 80^\circ$
 $= 37\,422.694 \text{ m}^2$

M1

Mass of carrots = $2.5 \times 37\,422.694$
 $= 93\,556.7 \text{ kg}$
 $= 93.6 \text{ tonnes (3sf)}$

M1

A1

17 $\frac{1}{2}(x+3+2x+1)(9) = 108$

M1

$x = 6\frac{2}{3}$ or 6.67 (3sf)

A1

Accept 6.67

18 a $\frac{2}{1000}$
 $= \frac{1}{500}$

M1

A1

b $s = r\theta$
 $10 = 10\theta$
 $\theta = 1 \text{ rad}$

BI

c Area = $\frac{1}{2}(10)^2(1)$
 $= 50 \text{ m}^2$

M1

A1

19 a $84 = 2^2 \times 3 \times 7$

BI

b (i) HCF = 12
(ii) LCM = 504
(iii) $k = 21$

BI

BI

BI

20 a One Exterior $\angle = \frac{360}{10} = 36^\circ$

BI

b Sum of interior $\angle s = 720^\circ$
 $720 - (3 \times 110) = 390^\circ$
Smallest $\angle = \frac{2}{13} \times 390$
 $= 60^\circ$

M1

M1

A1

21 a $15(x+1)$

BI

b $(3x-7)(2x+5)$
 $= 6x^2 - 14x + 15x - 35$
 $= 6x^2 + x - 35$

M1

A1

c $\frac{3}{(y-2)} - \frac{4}{y}$
 $= \frac{3y-4(y-2)}{y(y-2)}$
 $= \frac{3y-4y+8}{y(y-2)}$
 $= \frac{-y+8}{y(y-2)}$
 $= \frac{8-y}{y(y-2)}$

M1

A1

22 a Number of boys = 12

BI

Height of students, h	Cumulative frequency
$h \leq 140$	3
$h \leq 150$	13
$h \leq 160$	14
$h \leq 170$	23
$h \leq 180$	25

b

BI
BI
I mark for every 2 correct answers.

c $\frac{2}{25} \times 100\%$
 $= 8\%$

M1

A1

23 a $x < 42$

BI

Largest integer = 41

BI

b $x - y = 34$

BI

c $3x + 7y = 32$

BI

$3(34+y) + 7y = 32$

M1

$102 + 10y = 32$

$y = \frac{32-102}{10} = -7$

$y = -7, x = 27$

A1

A1

24	a	Volume = $\pi \times 10^2 \times 40$ = 12568 cm ³ = 12.568 litres	M1 A1
	b	Volume of cup = $\pi \times 2.4^2 \times 8$ = 144.78 cm ³	M1
		Number of cups = $12568 \div 144.78$ = 86.807 Max. number of filled cups = 86	M1 A1
25	a	A (0, 0) B (5, 0)	BI BI
	b	(i) C (3, 6)	BI
		(ii) AC = $\sqrt{3^2 + 6^2}$ = 6.71 units (3sf)	M1 A1

Calculator Model:		
Name	Index Number	Class



WOODGROVE SECONDARY SCHOOL

N LEVEL PRELIMINARY EXAMINATION 2018

LEVEL & STREAM : SECONDARY 4 NORMAL (ACADEMIC)
SUBJECT (CODE) : ELEMENTARY MATHEMATICS (4045)
PAPER NO : 02
DATE / DAY : 15 AUGUST 2018 / WEDNESDAY
DURATION : 2 HOURS

READ THESE INSTRUCTIONS FIRST

Write your answers and working on the separate writing paper provided.
 Write your class, index number and name on the work you hand in.
 Write in dark blue or black pen on both sides of the paper.
 You may use a pencil for any diagrams or graphs.
 Do not use staples, paper clips, glue or correction fluid.

Section A
 Answer all questions.

Section B
 Answer one question.

The number of marks in given in brackets [] at the end of each question or part question.
 The total number of marks for this paper is 60.

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 correct to three significant figures. Give answers in degrees to one decimal place.
 For π , use either your calculator value of 3.142.

At the end of the examination, fasten all your work securely together.

DO NOT TURN OVER THE QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

Mathematical Formulae

Compound Interest

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

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 = $\frac{4}{3} \pi r^3$

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

Arc length = $r\theta$, where θ is in radians

Sector area = $\frac{1}{2} r^2 \theta$, where θ 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

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

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

Section A (53 marks)

Answer all the questions in this section.

- 1 (a) Factorise $3p^2 - 27$ completely. [2]

- (b) It is given that $r = \frac{2p-5}{q}$. [2]

- (i) Find the value of r when $p = 8$ and $q = 12$. [1]

- (ii) Express p in terms of q and r . [2]

- 2 The scale of a map is 1 : 40 000.

- (a) Find, in cm, the length of a line on the map representing a road of 12.5 km. [2]

- (b) Find the actual area of a plot of land, in km^2 , which when represented on the map is 45 cm^2 . [2]

- 3 Nolan wanted to find out the mean height of adult Singaporean males. He obtained the heights of seven of his adult male colleagues to calculate the mean height. Their heights (in metres) are shown below.

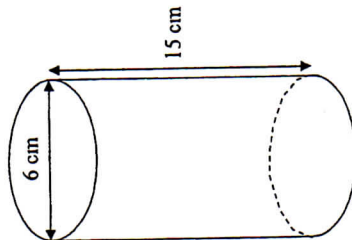
1.53 1.57 1.63 1.67 1.72 1.74 1.82

- (a) Explain why Nolan's method is not a good method for obtaining the mean height of adult Singaporean males. [1]
- (b) Calculate the mean height of Nolan's seven colleagues. [2]
- (c) Calculate the standard deviation of the heights of Nolan's seven colleagues. [2]

- 4 The quadrilateral $PQRS$ has $PQ = 5 \text{ cm}$, $QR = 7 \text{ cm}$, $RS = 6 \text{ cm}$, $SP = 8 \text{ cm}$ and $\angle PQR = 110^\circ$.

- (a) Construct the quadrilateral $PQRS$. [2]
- (b) Construct the angle bisector of $\angle PQR$. [1]
- (c) Construct the perpendicular bisector of PQ . [1]
- (d) At the point where the two lines from (b) and (c) intersect, mark the point with M . Measure and write down the length of PM . [2]

- 5 The diagram below shows a closed cylinder with diameter of 6 cm and height of 15 cm.



Taking $\pi = 3.142$, find

- (a) the volume of the cylinder, [2]
- (b) the total surface area of the cylinder. [2]

- 6 Mr Dawson sold 10 cars valued at \$150 000 each and received a commission of 1.5% on each of his sales. He spent \$3000 on advertisements and 20% of the remainder of his commission on petrol.

- (a) How much was his total commission? [2]
- (b) How much did he spend on petrol? [2]

- 7 A straight line passes through the points (0, 3) and (1, 8). Find
- (a) the gradient of the line, [2]
- (b) the equation of the line. [1]

- 8 Timothy started his journey at 0730. He travelled from Town A to Town B which was 36 km apart at an average speed of 48 km/h. He continued his journey travelling at an average speed of 54 km/h from Town B and arrived at Town C 1 hour 30 minutes later.

Calculate

- (a) the time, in hours, he took to arrive at Town B, [2]
- (b) the distance between Town B and C, [2]
- (c) the average speed, in km/h, for the whole journey. [2]

5

- 9 (a) Given that $v^2 = u^2 + 2as$, express s in terms of u , v and a . [2]
 (b) Solve the equation $\frac{x}{x-1} + \frac{2}{5} = \frac{3}{2}$. [3]
 (c) Solve $x^2 + 2x - 15 = 0$. [3]

- 10 The table below shows part of the PUB bill incurred for electricity, gas and water for the household use by Mr Waryce's family.

CURRENT MONTH CHARGES		
Electricity Services	Usage	Rate (\$)
Opening Reading on 19-07-2016 : 57984		
Reading taken on 04-08-2016 : 58218		
Electricity	234 kWh	0.2728
Gas Services by City Gas Pte Ltd		
Opening Reading on 19-07-2016 : 8850		
Reading taken on 04-08-2016 : 8862		
Gas	12 kWh	0.1799
Water Services by Public Utilities Board		
Opening Reading on 19-07-2016 : 1580.8		
Reading taken on 04-08-2016 : 1593.8		
Water	13.0 Cu M	1.1700

- (a) Find the amount payable for water usage. [1]
 (b) Given that the rate of GST on the utilities bill is 7%, find the GST that Mr Waryce's family has to pay. [2]
 In the following month, the consumption of gas decreased to 10kWh, electricity increased by 20% and consumption of water remained unchanged.
 (c) Find the percentage decrease in the consumption of gas. [2]
 (d) Find the total utilities bill inclusive of GST to 2 decimal places. [3]

6

Answer one question in this section. Each question carries 7 marks.

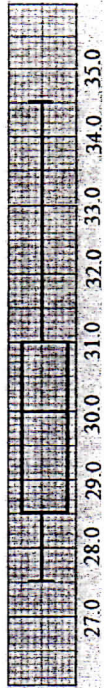
- 11 The average daily temperature, in degrees Celsius ($^{\circ}\text{C}$), of City A measured for 11 days are shown below.

29.5 32.1 33.2 30.1 33.9 32.7 29.9 33.0 30.7 33.6 29.9

(a) Find

- (i) the range, [1]
 (ii) the median temperature, [1]
 (iii) the interquartile range. [3]

- (b) The box-and-whisker diagram shows the average temperature of City B in the same period.



A report commented that the average temperature of City B during these 11 days is generally higher than that of City A. Do you agree? Give a reason to support your answer. [2]

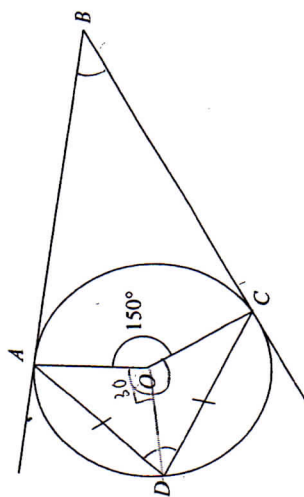
- 12 In the diagram below, AB and BC are tangents to the circle, with centre O , $AD = DC$ and

Remarks	Marks	Solution
---------	-------	----------

2

7

$$\angle AOC = 150^\circ$$



(a) Stating the reasons clearly, find

- (i) $\angle OAB$.
- (ii) $\angle ABC$.
- (iii) $\angle ADC$.
- (iv) $\angle DAO$.

[1]
[2]
[1]
[2]

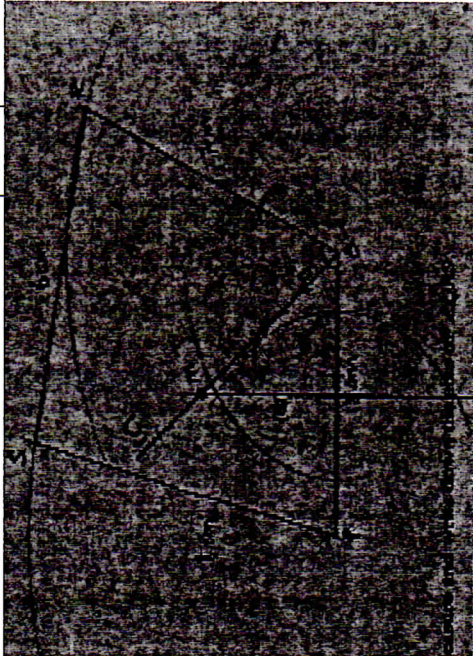
(b) Name the quadrilateral $ABCD$.

[1]

END OF PAPER 2

Section A

Qn.	Solution	Marks	Remarks
1(a)	$3(p^2 - 9)$ $= 3(p - 3)(p + 3)$	M1 A1	1 mark common factor 1 mark $a^2 - b^2$
1(b)(i)	$r = \frac{11}{12}$	B1	
1b(ii)	$rq = 2p - 5$ $p = \frac{rq+5}{2}$	M1 A1	
2(a)	Actual : Map 40 000 : 1 40 000 cm : 1 cm 0.4 km : 1 cm 12.5 km : $\frac{12.5}{0.4}$ cm 12.5 km : 31.25 cm Map length = 31.25 cm	M1 A1	
2(b)	Map : Actual 1 cm : 0.4 km 1 cm ² : 0.16 km ² 45 cm ² : 0.16×45 km ² 45 cm ² : 7.2 km ²	M1 A1	
3(a)	Sample size is too small; Should consider a wider range of Singaporeans, from other workplaces; His colleagues may not be Singaporeans	B1	Accept any appropriate answer
3(b)	Mean = $\frac{1.53 + 1.57 + 1.63 + 1.67 + 1.72 + 1.74 + 1.82}{7}$ $= \frac{11.68}{7}$ ≈ 1.67 m (3 s.f) or $1\frac{117}{175}$	M1 A1	Accept B2

Qn.	Solution	Marks	Remarks
3(c)	$S.D = \sqrt{\frac{19.55}{7} - \left(\frac{11.68}{7}\right)^2}$ $= 0.093415913$ ≈ 0.0934 m (3 s.f)	M1 A1	Accept B2
4a/b/c	 4 sides of a quadrilateral drawn - B1 $\angle PQR$ measured and drawn correctly - B1 Perpendicular bisector constructed correctly - B1 Angle bisector constructed correctly - B1		
4(d)	4.3 cm Mark and label M	B1 B1	4.1 - 4.5 cm
5(a)	Volume = $3.142 (3)^2 (1.5)$ $= 424.17$ cm ³	M1 A1	Penalise for D.O.A if exact answer is not given.
5(b)	Curved surface area = $(3.142)(6)(1.5)$ $= 282.78$ Total surface area = $282.78 + 2(3.142)(3)^2$ $= 339.336$ cm ²	M1 A1	Penalise for D.O.A if exact answer is not given.

Qn.	Solution	Marks	Remarks
6a	Total commission = $\frac{1.5 \times 10 \times 150000}{100}$ = \$22500	M1 A1	
6b	Amount spent on petrol = $\frac{20}{100} \times (22500 - 3000)$ = \$3900	M1 A1	
7a	Gradient of the line = $\frac{8-3}{1-0}$ = 5	M1	
7b	Hence, the gradient of the line is 5. Equation of line: $y = 5x + 3$	A1 B1	
8a	Time = $\frac{36}{48}$ = $\frac{3}{4}$ h or 0.75h	M1 A1	
8b	1 h 30 min = 1.5 h Distance = 54×1.5 = 81 km	M1 A1	
8c	Total distance = $36 + 81$ = 117 km Total time = $0.75 + 1.5$ = 2.25 h Average speed = $\frac{117}{2.25}$ = 52 km/h	M1 A1	
9(a)	$v^2 = u^2 + 2as$ $v^2 - u^2 = 2as$ $s = \frac{v^2 - u^2}{2a}$	M1 A1	

Qn.	Solution	Marks	Remarks
9(b)	$\frac{x}{x-1} + \frac{2}{5} = \frac{3}{2}$ $\frac{x(5)}{5(x-1)} + \frac{2(x-1)}{5(x-1)} = \frac{3}{2}$ $\frac{5x+2(x-1)}{5(x-1)} = \frac{3}{2}$ $\frac{5x+2x-2}{5(x-1)} = \frac{3}{2}$ $\frac{7x-2}{5(x-1)} = \frac{3}{2}$ $\frac{7x-2}{5x-5} = \frac{3}{2}$ $2(7x-2) = 3(5x-5)$ $14x-4 = 15x-15$ $14x-15x = -15+4$ $-x = -11$ $x = 11$	M1	
9(c)	$x^2 + 2x - 15 = 0$ $(x+5)(x-3) = 0$ $x+5 = 0$ or $x-3 = 0$ $x = -5$ $x = 3$	M1 A1/A1	
10(a)	Amount = $13 \times 1.17 = \$15.21$	B1	
10(b)	Total = $(234 \times 0.2728) + (12 \times 0.1799) + 15.21$ = 81.204 GST = $\frac{7}{100} \times 81.204$ = \$5.68 (2d.p)	M1 A1	
10(c)	Decrease = $12 - 10$ = 2kWh Percentage = $\frac{2}{12} \times 100\%$ = 16.7% (3 s.f)	M1 A1	

Qn.	Solution	Marks	Remarks
10(d)	Electricity = $1.2 \times 234 \times 0.2728$ = \$76.602 Total bill = $76.602 + (10 \times 0.1799) + 15.21$ = 93.611 With GST = 93.611×1.07 = \$100.16 (2d.p)	M1 M1 A1	

Section B

11(a)(i)	$33.9 - 29.5 = 4.4^\circ\text{C}$	B1	
11a(ii)	32.1°C	B1	
11a(iii)	$Q_1 = 29.9^\circ\text{C}$ $Q_3 = 33.2^\circ\text{C}$ interquartile range = $33.2 - 29.9$ = 3.3°C	M1 M1 A1	
11(b)	No. Median of City A is 32.1°C , higher than that of B, 30.0°C .	B1 B1	
12ai	$\angle OAB = 90^\circ$ (tangent $\perp$ radius of circle)	B1	Minus 1 mark if reasons not stated
12a(ii)	$\angle AOB = 75^\circ$ (OB bisects $\angle AOB$) $\angle ABO = 15^\circ$ (sum of angles in triangle) $\angle ABC = 30^\circ$	M1 A1	
12a(iv)	$\angle ADC = \frac{150}{2}$ = 75° ($\angle$ at centre = twice $\angle$ at circumference)	B1	
12a(iv)	$\angle AOD = \frac{360 - 150}{2} = 105^\circ$ $\angle DAO = \frac{180 - 105}{2} = 37.5^\circ$ (isosceles Δ)	M1 A1	
12b	Kite	B1	