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Candidate Name	Class	Register Number
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CHANGKAT CHANGI SECONDARY SCHOOL

Mid Year Examination 2018

Subject	:	Mathematics
Level	:	Sec 2 Normal Academic
Paper	:	4045/01
Date	:	10 May 2018
Duration	:	1 Hour 15 Minutes
Setter	:	Mr Helmi

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, class and register number in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, 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 total of the marks for this paper is 50.

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 your answers in degrees to one decimal place.

For π , use either your calculator value or 3.142

For Examiners' Use	Marks
Marks	/ 50
Personal Target	Actual Grade
Parent's / Guardian's Signature	

Mathematical Formulae*Compound Interest*

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

Mensuration

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

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

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

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

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

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

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

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

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

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 Round off 39.987 to

(a) the nearest whole number,

Answer [1]

(b) 3 significant figures,

Answer [1]

(c) the nearest hundredth.

Answer [1]

2 Express 30 min, 1 h 15 min and **15min** as a ratio in its simplest form.

Answer : : [2]

3 Solve the following pair of simultaneous equations.

$$2x + y = 9$$

$$5x - y = 5$$

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

[Turn Over]

- 4 (a) Factorise $x^2 + 8x + 16$ using special results $a^2 + 2ab + b^2$.

Answer [1]

- (b) Without using a calculator, use your answer in part (a) to evaluate $96^2 + 8 \times 96 + 16$.

Answer [2]

- 5 (a) If $a : b = 3 : 4$ and $b : c = 5 : 7$, find $a : b : c$.

Answer : : [2]

- (b) To bake a cake, flour, butter and sugar must be mixed in the ratio of 6 : 2 : 1.
If 360g of butter was used, how much flour was added?

Answer g [2]

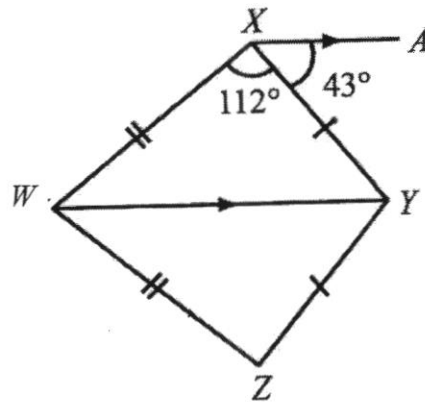
- 6 (a) Simplify the expression $6pq - 1 - 5 - pq$.

Answer [1]

- (b) Find the value of the expression when $p = -3$, $q = 2$. Show your working clearly.

Answer [2]

- 7 It is given that figure $WXYZ$ is a kite, $\angle WXY = 112^\circ$, $\angle AXY = 43^\circ$ and XA is parallel to the diagonal WY . Find



- (a) $\angle WYX$,

Answer $^\circ$ [1]

- (b) $\angle XWZ$,

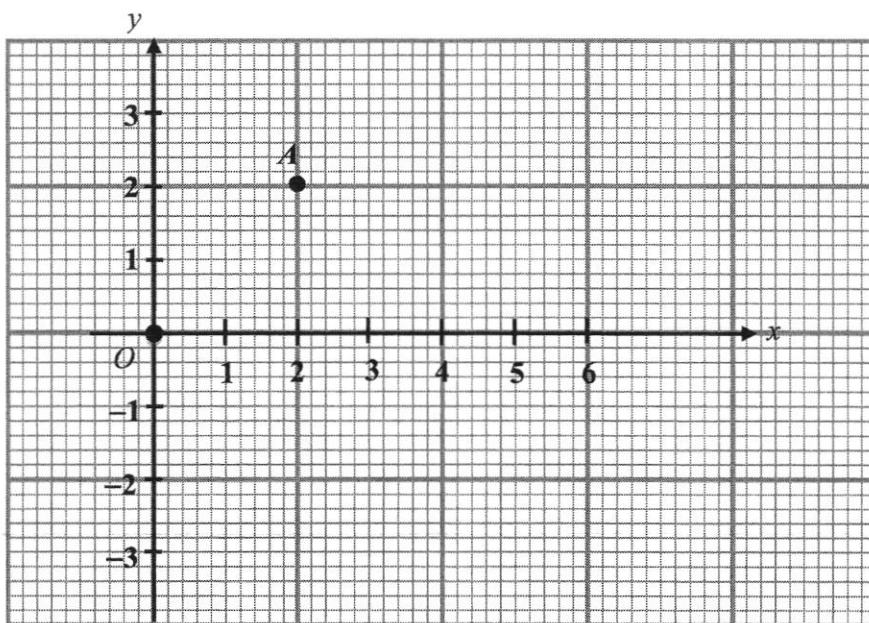
Answer $^\circ$ [1]

- (c) reflex $\angle WZY$.

Answer $^\circ$ [1]

[Turn Over]

- 8 In the diagram below, point O is the origin. The point A is marked on the grid.



- (a) Write down the coordinates of point A .

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

- (b) Point B has a coordinate of $(5, 0)$. Mark it on the grid above and draw the line AB . [1]

- (c) Find the gradient of line AB .

Answer [2]

- (d) Find the area of triangle OAB .

Answer unit^2 [2]

9 A map is drawn to a scale of 1: 200 000.

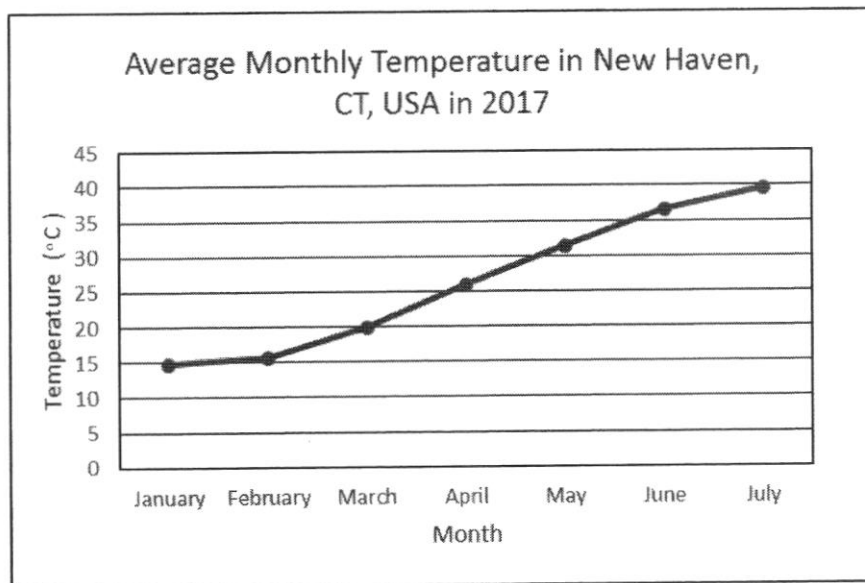
- (a) This scale can be written in the form 1 cm: d km.
Find d .

Answer km [1]

- (b) On the map the area of a forest is 5 cm².
Calculate the real area of the forest, in square kilometres.

Answer km² [2]

- 10 A reporter claimed that global warming is causing a rise of temperature in New Haven in 2017. Do you think the reporter's claim may be incorrect? Explain your answer.



Answer.....

.....

.....

[2]

- 11 V is inversely proportional to n . When $V = 12$, $n = 4$.
Complete the table in the answer space.

n	4	8	
V	12		3

Answer $V = \dots\dots\dots$, $n = \dots\dots\dots$ [2]

- 12 540 expressed as a product of its prime factors is $2^2 \times 3^3 \times 5$.

(a) Express 126 as a product of its prime factors.

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

(b) Find

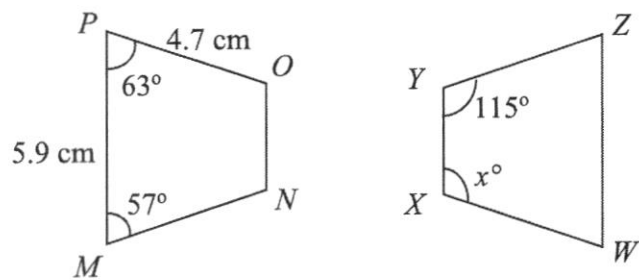
(i) the highest common factor (HCF) of 540 and 126,

Answer $\dots\dots\dots$ [1]

(ii) the lowest common multiple (LCM) of 540 and 126.

Answer $\dots\dots\dots$ [1]

- 13 Figure $MNOP$ is congruent to Figure $WXYZ$.



Find

- (a) the value of length YZ ,

Answer cm [1]

- (b) angle x .

Answer $x =$ [2]

- 14 Solve the following inequalities.

- (a) $-2x \leq 6$,

Answer [1]

- (b) $4x + 6 \geq 20$, illustrating your answer on a number line.

[2]

_____ $\rightarrow x$

15 Solve the following equations.

(a) $2x + 7 = 19,$

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

(b) $\frac{3-x}{4} = \frac{x}{3},$

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

(c) $\frac{2x-1}{2} - \frac{x-2}{3} = 3.$

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

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CHANGKAT CHANGI SECONDARY SCHOOL

Mid Year Examination 2018

Subject	:	Mathematics
Level	:	Sec 2 Normal Academic
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Date	:	11 May 2018
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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 total of the marks for this paper is 50.

Answer all questions on the writing paper and graph paper provided.

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 your answers in degrees to one decimal place.

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Marks	/ 50
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Mathematical Formulae

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

Answer **all** the questions

1 Expand and simplify the following expressions.

- (a) $(4a)(5a^2)$, [1]
(b) $(2d + 6)(2d - 6)$, [1]
(c) $(5c - 1)^2$, [1]
(d) $4(b + 3)(2 - b)$. [2]
-

2 (a) Given that the relationship connecting x and y is $y = kx^2$, where k is a constant and $y = 54$ when $x = 3$. Find

- (i) the value of k , [1]
(ii) the value of y when $x = 2$, [1]
(iii) the value of x when $y = 60$. [2]

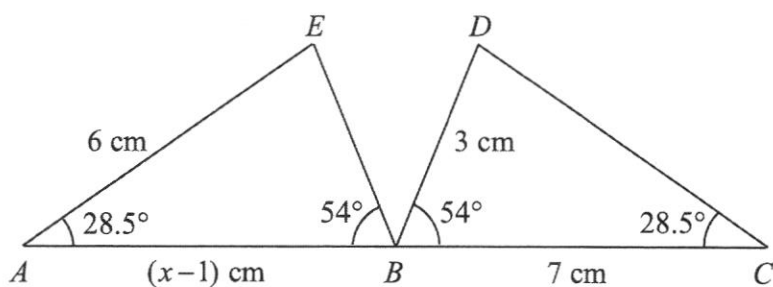
(b) A contractor estimated that he could complete a building project in 1 year with 140 men. If he was asked to do the work in 10 months, how many more men would he need to employ? [3]

3 Factorise the following expressions completely.

- (a) $6x + 2xy$, [1]
(b) $b - 2a + 3bc - 6ac$, [2]
(c) $x^2 + 3x + 2$, [1]
(d) $3x^2 - 12y^2$. [2]
-

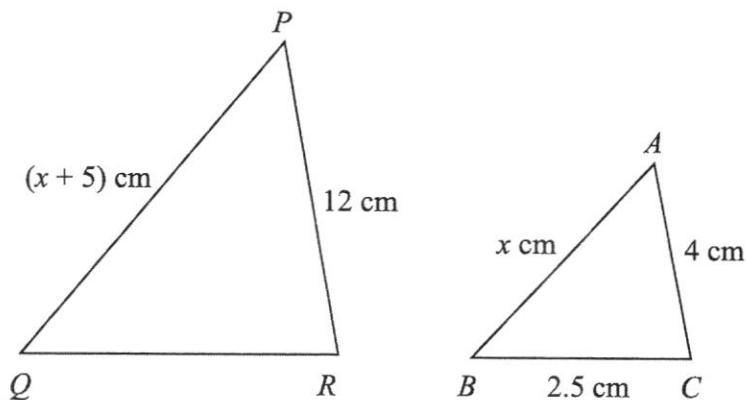
[Turn Over

- 4 (a) Given that $\triangle ABE$ and $\triangle CBD$ are congruent. ABC is a straight line.



Find

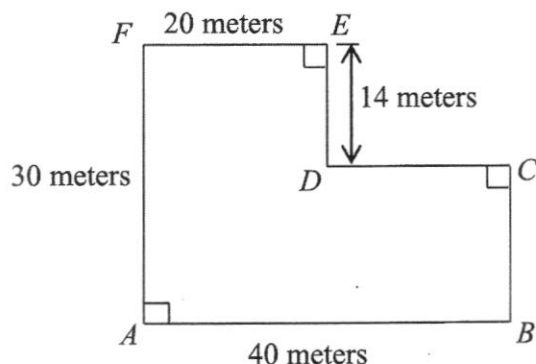
- (i) the length of CD , [1]
 - (ii) the value of x , [1]
 - (iii) $\angle DBE$. [2]
- (b) $\triangle ABC$ is similar to $\triangle PQR$, $BC = 2.5$ cm, $PQ = (x + 5)$ cm, $AC = 4$ cm, $AB = x$ cm and $PR = 12$ cm.



Find

- (i) QR , [2]
 - (ii) PQ . [2]
-
- 5 (a) Find the integer p for which $3p - 1 < 20$, where p is an odd number. [2]
- (b) Find the greatest prime number x that satisfies the inequality $4x - 35 < 37 - 2x$. [2]
-

- 6 The diagram is a map of a condominium room $ABCDEF$ (not drawn to scale). It is to be represented on a map of scale 1 : 400. Calculate



- (a) the length, in cm of the line on the map representing AB , [1]
- (b) the perimeter, in cm of the room, on the map, [2]
- (c) the area of the room on the map in cm^2 . [2]
-
- 7 Answer this question on a single sheet of graph paper.

- (a) It is given that $y = 2x - 1$, copy and complete the following table. [2]

x	-2	-1	0	1	2
y		-3	-1	1	

- (b) Draw the graph of $y = 2x - 1$ for values of x from -2 to 2, using a scale of 2 cm to 1 unit on both axes. [2]
- (c) On the same axes, draw the graph of $y = 2 - x$. [2]
- (d) Hence, solve the simultaneous equations of $y = 2x - 1$ and $y = 2 - x$. [2]
-

- 8 The diagram below shows Jake's typical cycling path from Simei MRT to Melville Park using bikes from a bike-sharing company.



- (a) Measure the cycling path and calculate the actual cycling distance from Simei MRT to Melville Park. Leave your answer in metres. [2]
- (b) At a constant cycling speed of 40 metres per minute, how long does it take for Jake to cycle from Simei MRT to Melville Park? [1]

- (c) The table below shows the charges for the 3 bike-sharing companies.

[4]

	 UBIKE	 UFO	 MUBIKE
Where to Find	MRT Stations, East Coast Park, Gardens by the Bay	West Coast Park, Sentosa, Esplanade	MRT Stations, Changi Village, Pulau Ubin, Coney Island
How to Use	Scan a QR code on the bike using the app to unlock the bike	Unlock bike manually using 4-digit code sent by UFO app	Unlock bike manually using 3-digit code sent by MUBIKE app
Price	\$2 / hr	\$1 / km	\$1 / km

Which bike-sharing company should Jake choose to cycle from Simei MRT to Melville Park? Justify your answer and show your workings clearly.

End of Paper

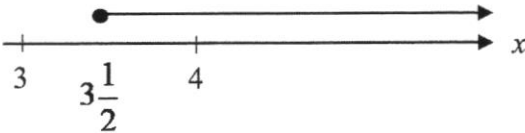


CHANGKAT CHANGI SECONDARY SCHOOL

2018 Sec 2 NA Mid-Year Exam Paper 1 Marking Scheme

Qn.	Marking Point		Marks	Total
1	(a)	40	B1	3
	(b)	40.0	B1	
	(c)	39.99	B1	
2			M1 A1	2
3	By substitution, $5x - (9 - 2x) = 5$ $x = 2$ $y = 5$		M1 (accept equivalent method) A1 A1	3
4	(a)		B1	3
	(b)		M1 A1	
5	(a)		M1 A1	4
	(b)		M1 A1	
6	(a)		B1	3
	(b)		M1 A1	
7	(a)		B1	3
	(b)	50°	B1	
	(c)	248°	B1	

8	(a)	$A(2, 2)$	B1	6
	(b)	Line AB drawn correctly. 	B1	
	(c)	$\text{gradient} = \frac{2-0}{2-5}$ $= -\frac{2}{3}$	M1 A1	
	(d)	$\frac{1}{2} \times 5 \times 2$ $= 5 \text{ unit}^2$	M1 A1	
9	(a)	2 km	B1	3
	(b)	$1 \text{ cm}^2 : 4 \text{ km}^2$ 20 km^2	M1 A1	
10	The line graph shows only 7 months of data.		A1	2
	The reporter's claim may be wrong as there can be a drop in the temperature in the next 5 months in 2017.		A1	
11	$V = 6$ $n = 16$		B1 B1	2
12	(a)	Using short division or factor tree $126 = 2 \times 3^2 \times 7$	M1 A1	
	(b)(i)	HCF = 18	B1	

	(b)(ii)	LCM = 3780	B1	4
13	(a)	4.7	B1	3
	(b)	$360^\circ - 115^\circ - 63^\circ - 57^\circ$ $= 125^\circ$	M1 A1	
14	(a)	$x \geq -3$	B1	3
	(b)	$x \geq 3\frac{1}{2}$ 	A1 A1	
15	(a)		B1	6
	(b)	$3(3-x) = 4x$ $x = 1\frac{2}{7}$	M1 A1	
	(c)	$\frac{3(2x-1) - 2(x-2)}{6} = 3$ $6x - 3 - 2x + 4 = 18$ $x = 4\frac{1}{4}$	M1 M1 A1	

2018 Sec 2 NA Mid Year Exam Paper 2 Marking Scheme

Qn.	Marking Point	Marks	Total
1	(a) $20a^3$	B1	5
	(b) $4d^2 - 36$	B1	
	(c) $25c^2 - 10c + 1$	B1	
	(d) $8b - 4b^2 + 24 - 12b$ $= -4b^2 - 4b + 24$	M1 A1	
2	(a)(i) $k = 6$	B1	7
	(a)(ii) $y = 24$	B1	
	(a)(iii) $60 = 6(x^2)$ 3.16 or -3.16	M1 A1	
	(b) $1 \text{ month} \rightarrow 140 \times 12 \text{ men}$ $10 \text{ months} \rightarrow \frac{140 \times 12}{10} = 168 \text{ men}$ $\therefore 168 - 140 = 28 \text{ men}$ $\text{men} = \frac{1680}{10 \text{ months}}$ $\therefore \text{Extra men} = 168 - 140 = 28 \text{ men}$	M1 A1 A1	
3	(a) $2x(3+y)$	B1	6
	(b) $1(b-2a) + 3c(b-2a)$ $= (b-2a)(1+3c)$	M1 A1	
	(c) $(x+1)(x+2)$	B1	
	(d) $3(x^2 - 4y^2)$ $= 3(x+2y)(x-2y)$	M1 A1	
4	(a)(i) 6 cm	B1	
	(a)(ii) 8	B1	
	(a)(iii) $\angle DBE = 180^\circ - 54^\circ - 54^\circ$ (adj $\angle$ s on st. line) $= 72^\circ$	M1 A1	

	(b)(i)	$\frac{QR}{2.5} = \frac{12}{4}$ $QR = 7\frac{1}{2}\text{cm}$	M1 A1	8												
	(b)(ii)	$\frac{x+5}{x} = \frac{12}{4}$ $x = 2\frac{1}{2}$ $PQ = x+5$ $= 2\frac{1}{2} + 5 = 7\frac{1}{2}\text{cm}$	M1 A1													
5	(a)	$p < 7$ $\therefore p = 5$	B1 B1	4												
	(b)	$x < 12$ $\therefore$ greatest prime number = 11	B1 B1													
6	(a)	10 cm	B1	5												
	(b)	Perimeter = 140 m = 35 cm	A1 A1													
	(c)	Area = 920 m ² = 57 $\frac{1}{2}\text{cm}^2$	A1 A1													
7	(a)	<table border="1"><tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>-5</td><td></td><td></td><td></td><td>3</td></tr></table>	x	-2	-1	0	1	2	y	-5				3	B1 + B1	8
	x	-2	-1	0	1	2										
	y	-5				3										
	(b)	Correct scale drawn for both axes Point are plotted correctly and a line is drawn	A1 P1													
(c)	Table of values Point are plotted correctly and a line is drawn	T1 P1														
(d)	$x = 1$ $y = 1$	A1 A1														

8	(a)	Length of cycling path = 16 cm (Accept 15.5 cm to 16.5 cm) Distance of cycling distance from Simei MRT to Melville Park = 16×5000 = 80000 cm = 800 m	M1 A1	7
	(b)	Time taken for Jake to cycle from Simei MRT to Melville Park = $\frac{800}{40}$ = 20 mins	B1	
	(c)	UFO Bike is not considered as it is not available at Simei MRT. Cost of UBIKE: $20/60 \times 2 = \$0.67$ Cost of MUBUKE: $0.8 \times 1 = \$0.80$ Conclusion: Cost of UBIKE is cheaper. Hence Jake should choose MUBIKE.	A1 A1 A1 A1	