

**KRANJI SECONDARY SCHOOL** 

2NT

2 Oct 2019

Date

# **END-OF-YEAR EXAMINATION 2018**

## MATHEMATICS 4046 PAPER 1

Level	:	Secondary Two	Date .	2 001 2018
Stream	:	Normal Technical	Duration :	1 hr 30 min
Name	A	( )	Marks :	0
Class	:	Secondary		50

### **READ THESE INSTRUCTIONS FIRST:**

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Write your class, index number and name on all the work you hand in. Write in dark blue or black pen. You may use an HB 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 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  $\pi$ , use either your calculator value or 3.142.

#### Set by: Mr Chen Yongliang

#### Mathematical Formulae

Compound Interest

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

*Quadratic equation*  $ax^2 + bx + c = 0$ 

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Geometry and Measurement



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 pyramid =  $\frac{1}{3} \times \text{base area} \times \text{height}$ 

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

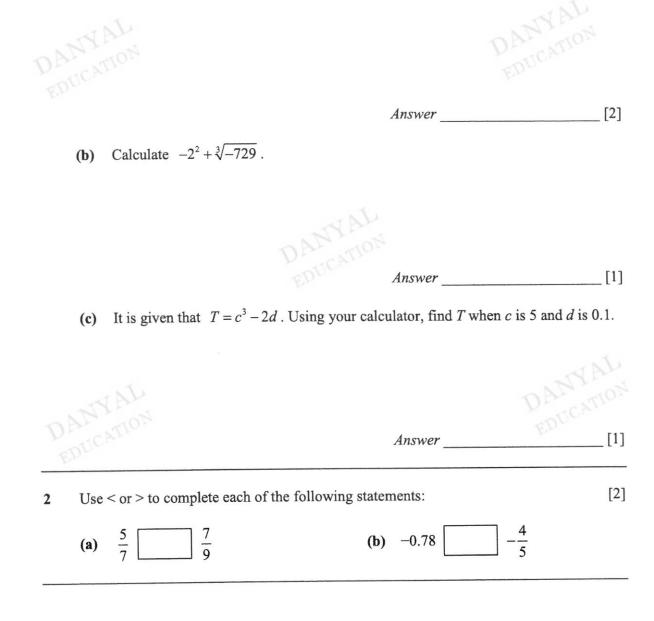






#### Answer all questions.

1 (a) Evaluate  $1\frac{1}{3} \div (-4\frac{3}{5})$ , leaving your answer as a fraction in its simplest form. Show your workings clearly.



3 Solve the equation  $4 = \frac{5}{x-2}$ .

Answer	EDU [3]

- 4 Simplify the following expressions, showing your workings clearly.
  - (a) 0.4(3j-5),



DANNA [2] EDUCATION **(b)** -4(3m-6)+5. Answer

5 At a hive, it takes 30 days for bees to make 90 kg of honey.

Find the number of days it will take to make 120 kg of honey.

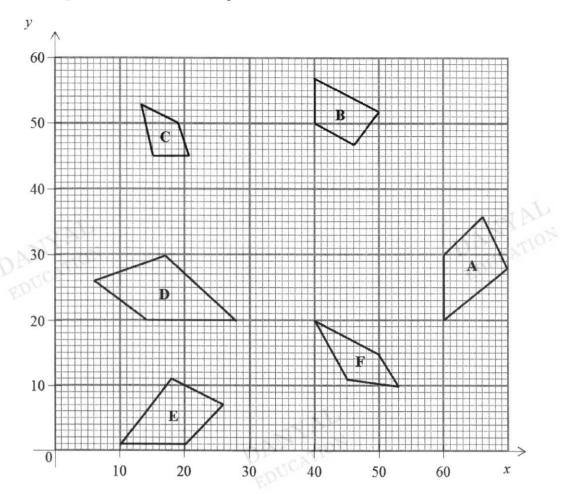
Answer \_\_\_\_\_days [2]

During the recent Great Singapore Sale, a pair of Calvin Klein trousers cost \$40. Its original price before the sale was \$75.

Calculate the percentage decrease in the price of the trousers.

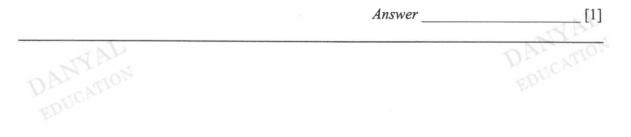
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DANYAL EDUCATION [2] Answer

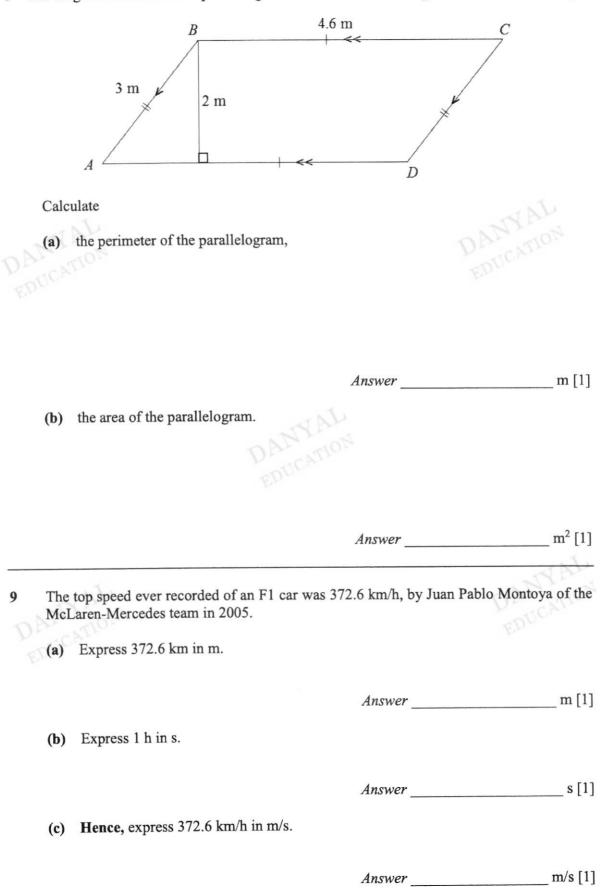


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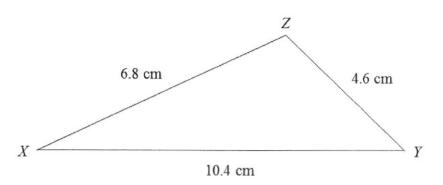
Identify the quadrilateral which is congruent to A.



8 The diagram below shows a parallelogram ABCD. AB is 3 m long, while BC is 4.6 m long.



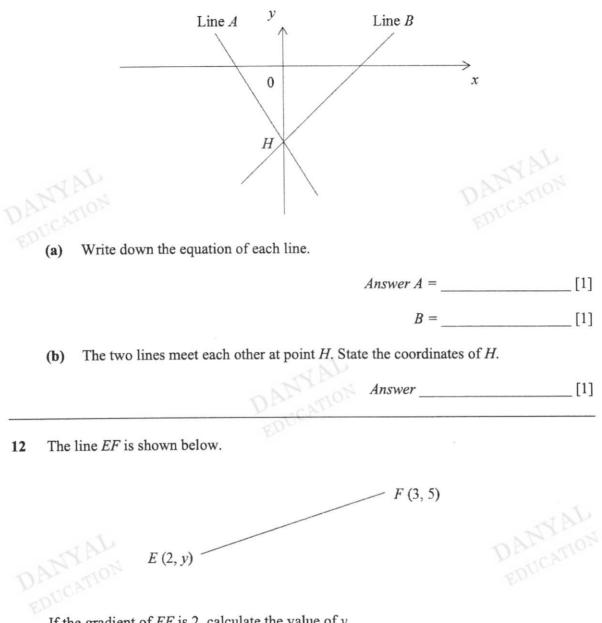
10 The diagram below shows a sketch of triangle XYZ, not to scale.



Using a ruler and a compass,

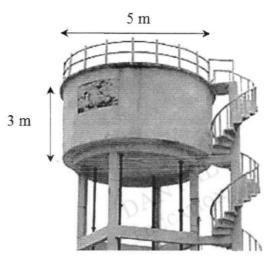
- (a) Draw triangle XYZ accurately in the space below. Label all points and lengths. [2]
- (b) On the same diagram, draw the
  - (i) perpendicular bisector of XY, [1]
  - (ii) angle bisector of angle XYZ. [1]
- Label the intersection point of both bisectors with the letter "A". Measure and record (c) the distance of YA.  $D_{Answer YA} = \underline{\qquad} cm [1]$

The sketch below shows two lines,  $y = -\frac{4}{3}x - 4$  and y = x - 4. 11



If the gradient of EF is 2, calculate the value of y.

- 13 The photograph below shows a cylindrical water tank of height 3 m and diameter 5 m.
  - (a) Find the total volume of the cylindrical tank, to three decimal places.



Answer \_\_\_\_\_ m<sup>3</sup> [2]

(b) Water leaks from the tank at  $0.72 \text{ m}^3$  per hour.

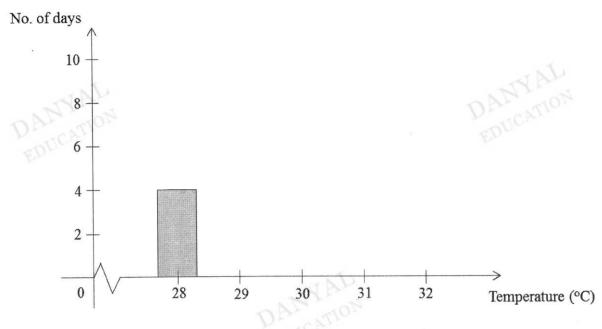
Find the time it would take for a fully-filled tank to become empty, correct to 4 significant figures.

Answer \_\_\_\_\_ hr [2]

14 The frequency table below shows the daily temperatures recorded in 2A1 classroom over the month of September.

Temperature (°C)	28	29	30	31	32
No. of days (frequency)	4	6	10	5	5

(a) In the grid below, complete the bar chart to represent the data. One bar has been drawn for you.
 [2]



(b) Calculate the mean classroom temperature in the month.

Answer °C [2]

(c) State the mode classroom temperature in the month.

11

*Answer* \_\_\_\_\_ °C [1]

- 15 The ratio of Alan's weight to Bob's weight is 4 : 5, while that of Alan's weight to Charlie's weight is 3 : 7.
  - (a) Find the ratio of Alan's to Bob's to Charlie's weights.

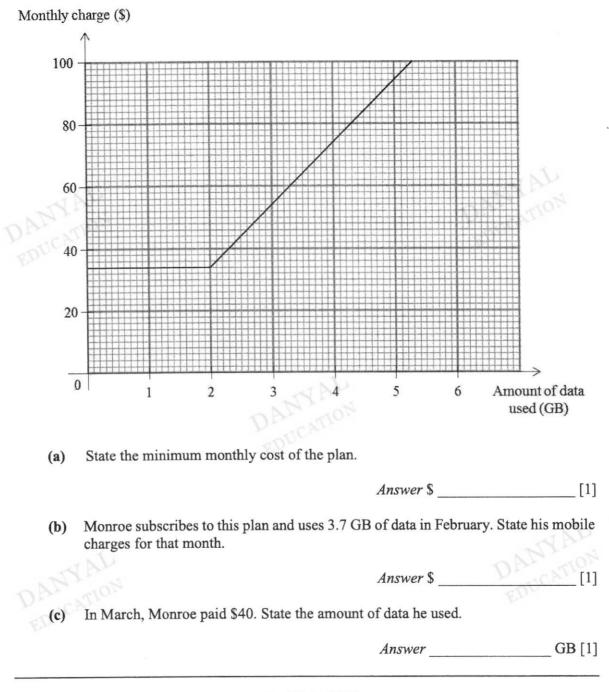
\_\_[1] Answer DAL ATION (b) If Bob weighed 45 kg, find Alan's weight. Answer [2]

16 A bank loan charges a simple interest of 3.5% per annum.

Mrs Lee took a \$100 000 loan from the bank. Calculate the total amount she will need to pay at the end of 7 years, correct to the nearest cent.

Answer \$ [2]

17 The graph below shows the monthly subscription fee of a mobile plan.



#### **END-OF-PAPER**



2NT

# **END-OF-YEAR EXAMINATION 2018**

# MATHEMATICS 4046 PAPER 2

Level	:	Secondary I wo	Date	:	3 Oct 2018
Stream	: 7	Normal Technical	Duration	S.P	1 hr 30 min
Name	P	UCATION ( )	) Marks	\$T	
Class	:	Secondary			50

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

Volume of pyramid =  $\frac{1}{3}$  × base area × height

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





#### Answer all questions.

1 Simplify  $\frac{2p}{5} - \frac{3-p}{4}$ , showing your workings clearly.

Answer [3]

- 2<sup>22</sup> Sally weighs c kg. Gopal is two times of Sally's weight. Jane weighs 7 kg less than Gopal.
  - (a) Express Gopal's and Jane's weights in terms of c.

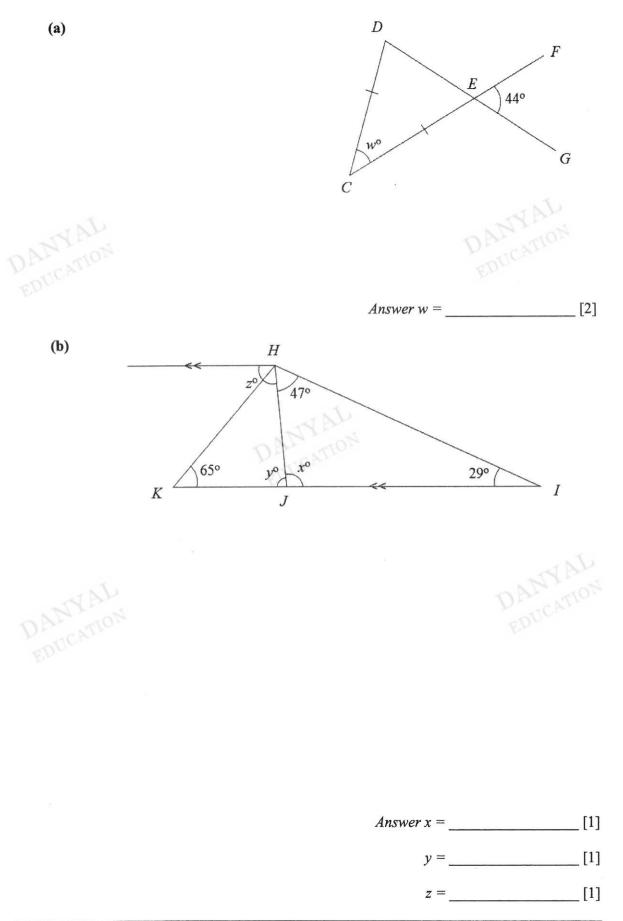
Answer Gopal's weight = \_\_\_\_\_ kg [1]

Jane's weight = \_\_\_\_\_ kg [1]

- (b) Form an equation in c to represent the total weight of the three people, if this is 189.5 kg. [1]
- (c) Hence, calculate Gopal's weight.

Answer Gopal's weight = \_\_\_\_\_ kg [3]

3 Find the values of the unknown angles in each of the following diagrams.

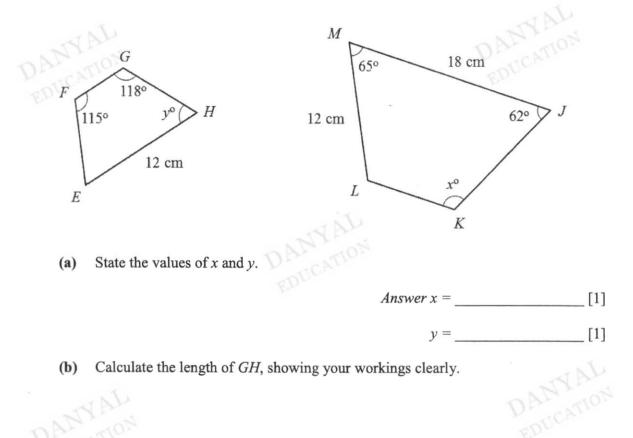


4 I am a quadrilateral with two pairs of equal, adjacent sides. My diagonals are perpendicular to each other, and I carry only one pair of equal, opposite angles.

What type of quadrilateral am I?

Answer \_\_\_\_\_ [1]

5 Two similar quadrilaterals *EFGH* and *JKLM* are shown below.



Answer GH =\_\_\_\_\_ cm [2]

Samantha enters a lift in her HDB block. The height reached by the lift (h metres) after t6 seconds is given by h = 3t.

Some values of h and t are given below.

t (seconds)	0	2	4	6	8
h (metres)	0	р	12	18	24

State the value of *p*. (a)

- Answer p =[1]
- Answer p = \_\_\_\_\_\_ Using a scale of 2 cm to 1 unit on the horizontal axis and 2 cm to 5 vertical axis, plot the graph of h = 3t in the grid below, for  $0 \le t \le 8$ . (b) Using a scale of 2 cm to 1 unit on the horizontal axis and 2 cm to 5 units on the EDUCATION [3]

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- On the way to school, Alisyah cycled at 15 km/h for 10 minutes, stopped for 6 minutes to 7 buy breakfast, and then continued cycling at 10 km/h for 3 minutes.
  - Find the total distance travelled by Alisyah, in km. (a)



DANYAL km [2] Answer

(b) Hence, calculate Alisyah's average speed for the entire journey, in km/h.



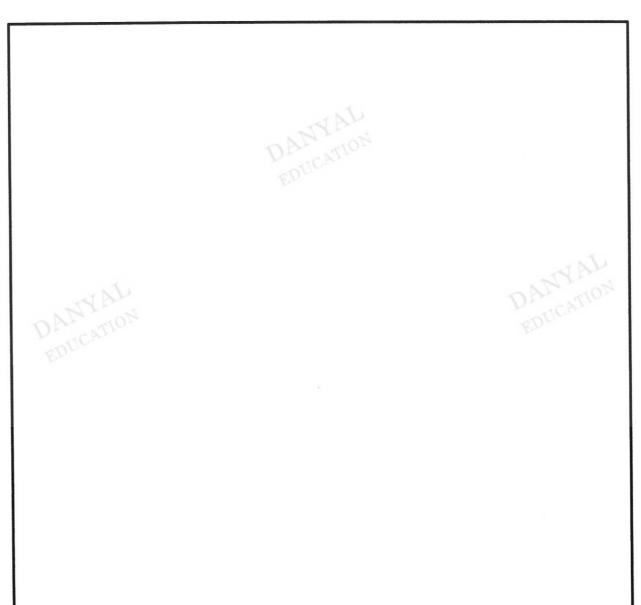
Answer km/h [2]

8 Tim opened up the packaging of a Toblerone chocolate.

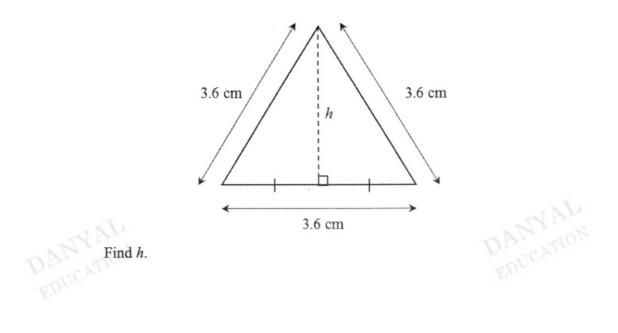
The packaging takes the form of a triangular prism, with an equilateral triangle base of side 3.6 cm.



(a) Using a ruler, sketch a net that he will get in the box below. Your drawing need not be to scale. Indicate the lengths of 3.6 cm and 20.9 cm clearly. [2]



- 9
- (b) The triangular face of the packaging has a vertical height, h, as shown below.



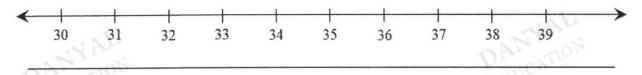
DANYAL Answer h =\_\_\_\_\_ cm [2]

(c) Hence, find the total surface area of the Toblerone packaging.

9 The number of sit-ups done by 10 students in a NAPFA test was recorded as follows:

35, 33, 32, 36, 36, 37, 38, 36, 35, 35

In the space below, complete the dot diagram to represent this information. [1]



10 The following box shows the ages (in years) of trees found in a particular area of the Botanic Gardens.

30	29	28
32	405	33
27	30	32

- (a) Calculate
  - (i) the mean age of the trees,

years [2] Answer

(ii) the median age of the trees.

Answer \_\_\_\_\_ years [1]

(b) Joanna states that the median represents the trees' ages better than the mean.

Do you agree with her, and why?

[2]

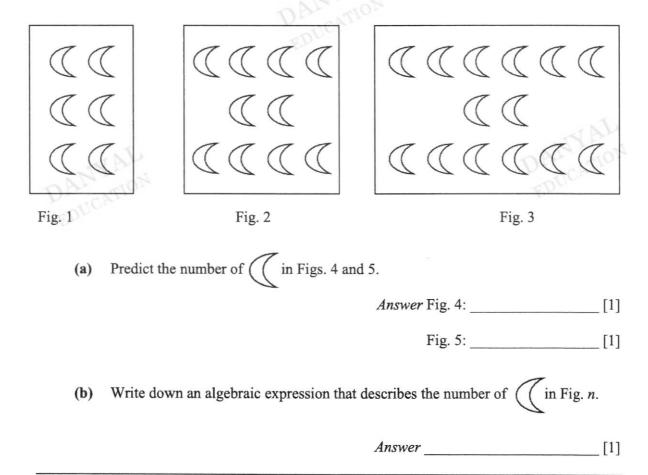
11 A box of chocolates contains three flavours – raisin, almond, and walnut. The probability of choosing a raisin-flavoured one is  $\frac{2}{5}$ , while the probability of choosing a walnut-flavoured one is  $\frac{17}{50}$ .

Find the probability of choosing an almond-flavoured one.



Answer [2]

12 A sequence of figures is shown below:



13 Ms Goh's utilities bill for May 2018 is shown below:

		May 2 Account	2018 Bill t No.
Breakdown of Current Charges	Usage	Rate (S)	Amount (S)
Electricity Services     Electricity Estimated on 18 May 2018	298 kWh	0.2215	66.01
Water Services by Public Utilities Board	NUMBER OF A COMPANY OF THE REPORT OF A COMPANY OF A COMPANY		March of the owner discontraction of the second second second second second second second second second second
Water Estimated on 18 May 2018	14.5 Cu M	x	17.26
Waterborne Fee	14.5 Cu M	0.7800	У.
Water Conservation Tax	\$17.26	35%	Z
Refuse Removal by Colex Environmental P L	1 Qty	7.71	7.71

(a) Write down the values of x to z. Express x to 4 decimal places, and y and z to the nearest cent.

Answer $x =$	\$	[1]	
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*y* = \$ \_\_\_\_\_[1]

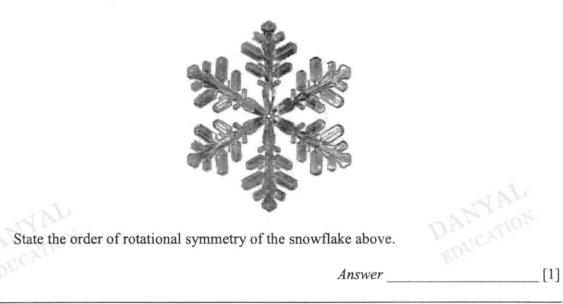
*z* = \$ \_\_\_\_\_ [1]

(b) The subtotal is the sum of all values in the 'Amount (\$)' column of the bill. A GST of 7% is applied on the subtotal.

Using your rounded off answers for part (a), calculate the amount of GST that Ms Goh paid for her utilities bill in May 2018, to the nearest cent.

*Answer* \$\_\_\_\_\_[2]

14 The diagram below shows a snowflake. When viewed under a magnifying glass, a snowflake's shape can be intricate and beautiful.



**END-OF-PAPER** 





## KRANJI SECONDARY SCHOOL

## 2018 EOY Paper 1 SECONDARY 2 NORMAL TECHNICAL MATHEMATICS MARKING SCHEME

Qn.		Working & Answers	
1	(a)	$1\frac{1}{3} \div (-4\frac{3}{5}) = \frac{4}{3} \div (-\frac{23}{5})$ $= \frac{4}{3} \times (-\frac{5}{23})$	
		$=-\frac{20}{69}$	NYAL
	(b)	-13	DATCALLOR
P	(c)	124.8	EDUC
2	(a)	$\frac{5}{7} < \frac{7}{9}$	
	(b)	$-0.78 > -\frac{4}{5}$	
3	$4 = -\frac{1}{x}$ $4x - \frac{1}{x}$	$\frac{5}{c-2}$ $8=5$	
	4x = x = 3	2	
4	(a)	0.4(3j-5) = 1.2j-2	
	(b)	-4(3m-6)+5 = -12m+24+5 = -12m+29	, SY A
5	No. c = $\frac{30}{90}$ = 40	of days it will take to make 120 kg of honey	EDUCATE
6	$=\frac{75}{2}$	entage decrease in the price of trousers $\frac{-40}{75} \times 100\%$ 7% or $46\frac{2}{3}\%$	
7	E	3	
8	(a)	Perimeter = $(3 \text{ m} \times 2) + (4.6 \text{ m} \times 2)$ = 15.2 m	
ŝ	(b)	$Area = 4.6 \times 2$ $= 9.2 \text{ m}^2$	

ï

9	(a)	372600 m	
	(bi)	3600 s	
	(bii)	103.5 m/s	
10	(a)	<ul> <li>Triangle XYZ drawn with accurate lengths a shown.</li> <li>All points and lengths labelled.</li> </ul>	nd compass markings
	(bi)	<ul> <li>Perpendicular bisector drawn accurately, wir shown.</li> </ul>	
	(bii)	Angle bisector drawn accurately, with comp	bass markings shown.
	(c)	5.4 cm	TAL
11	(a)	$A: y = -\frac{4}{3}x - 4$	DANTION
V	(b)	B: y = x - 4 (0, -4)	EDU
12	1	ient of $EF = \frac{y_2 - y_1}{x_2 - x_1} = 2$	
	There	2	
		$\frac{5-y}{3-2} = 2$	
		J 1	
		5 - y = 2 $-y = 2 - 5$ $-y = -3$	
		-v = -3	
		y = 3	
13	(a)	Vol. of the water tank = $\pi r^2 h$	
		$= \pi (2.5)^2 (3)$	×
		$= 18.75 \ \pi \mathrm{m}^3$	
		$= 58.90486 \text{ m}^3$	AT N
		$= 58.905 \text{ m}^3 (3 \text{ d.p.})$	- ANT
	5		DEACAT
7	(b)	Time taken for fully-filled tank to be empty = $58.905 \div 0.72$ = $81.8125$ hrs = $81.81$ hrs (4 s.f.)	
14	(a)	All remaining bars drawn with accurate heights.	2
14			
	(b)	Mean classroom temperature in Sep = $\frac{(28 \times 4) + (29 \times 6) + (30 \times 10) + (31 \times 5) + (32 \times 5)}{4 + 6 + 10 + 5 + 5}$	
		$= \frac{901}{30}$ = 30.0333°C	
		$= 30.0^{\circ}C (3 \text{ s.f.})$	
	(c)	30°C	

15	(a)	12:15:28	
	(b)	Alan's weight = $45 \text{ kg} \div 15 \times 12 = 36 \text{ kg}$	
16	Total	l interest that she will need to pay	
	= PR	RT	
	10	00	
	= (10	00000)(3.5)(7)	
	•	100	
	= \$24	4500	
	Total	amount she will need to pay after 7 years	
	= \$10	$00\ 000 + \$24\ 500$	
	= \$12	24 500	NAM
17	(a)	\$34	
D	(b)	\$68	000
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		



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## **KRANJI SECONDARY SCHOOL**

## 2018 EOY Paper 2 SECONDARY 2 NORMAL TECHNICAL MATHEMATICS MARKING SCHEME

Qn.		Working & Answers	Marks	Remarks
1	$\frac{2p}{5}$	$\frac{3-p}{4} = \frac{8p}{20} - \frac{15-5p}{20}$	M1	Converting each fraction to denominator of 20.
	JAI .	$=\frac{8p-15+5p}{20}$	M1	Combining both numerators, showing change of sign from -5p to +5p & +15 to -15.
D	DUCAT	$=\frac{13p-15}{20}$	A1	EDUCA
2	(a)	Gopal's weight = $2c \text{ kg}$	B1	
2	(a)	Jane's weight = $2c - 7 \text{ kg}$	B1	
	(b)	c + 2c + 2c - 7 = 189.5	B1	E.c.f. available.
	(c)	5c - 7 = 189.5	M1	This M1 is for combining all like terms in the eqn.
		5c = 196.5 c = 39.3	B1	This B1 is for finding $c$ .
		Gopal's weight = $2c$ = 2(39.3) = 78.6 kg	A1	
				<u> </u>
3	(a)	$\angle DEC = 44^{\circ} \text{ (vert. opp. } \angle s)$ $w = 180^{\circ} - 44^{\circ} - 44^{\circ} \text{ (base } \angle s \text{ of isos. } \Delta\text{)}$	M1	Accept if reasons are not included.
5	AN	$= 92^{\circ}$	A1	If final ans. w/o workings, then no marks.
	(b)	$x = 180^{\circ} - 47^{\circ} - 29^{\circ} (\angle \text{ sum of } \Delta)$ = 104°	B1	Accept if reasons are not included.
		$y = 180^{\circ} - 104^{\circ}$ (adj. on a str. line) = 76°	B1	
		$z = x \text{ (alt. } \angle s, // \text{ lines)}$ $= 104^{\circ}$	B1	Allow e.c.f. from <i>x</i> .
4	Kite		B1	
5	(a)	$x = 115^{\circ}$ $y = 65^{\circ}$	B1 B1	

	(b)	$\frac{EH}{JM} = \frac{GH}{LM}$ $\frac{12}{18} = \frac{GH}{12}$ $18 \ GH = 144$ $GH = 8 \ cm$	▶ M1	
			A1	
6	(a)	p = 6  m	B1	
	(b)	Axes labelled, together with axis markings using correct scale.	C1	NYAL
0	ANT	All points plotted correctly.	C1	DALCATION
- F	DUCA	Straight line drawn through all points.	C1	ED
7	(a)	Total distance travelled by Alisyah = $(15)(\frac{10}{60}) + (10)(\frac{3}{60})$	M1	
		= 3  km	A1	
	(b)	Total time taken $= \frac{10}{60} + \frac{3}{60} + \frac{6}{60}$ $= \frac{19}{60} h$	► M1	Also accept total time calculation in mins.
		Therefore, average speed of Alisyah = $3 \div \frac{19}{60}$ = 9.47368 km/h or $9\frac{9}{10}$ km/h		NYAL
5	AN	$19 = 9.47 \text{ km/h} (3 \text{ s.f.}) \text{ or } 9\frac{9}{19} \text{ km/h}$	A1	DAL EDUCATION
	6000	T		1
8	(a)	Correct net drawn that can form the prism.	C1	Net need not be drawn to scale. If ruler is not used, this B1 cannot be awarded.
		3.6 cm & 20.9 cm indicated (at least one each).	C1	
	(b)	By Pythagoras' Theorem, $h^2 + 1.8^2 = 3.6^2$ $h^2 + 3.24 = 12.96$ $h^2 = 9.72$	M1	

				1
		$h = \sqrt{9.72}$	A1	
		= 3.11769  cm	211	
		= 3.12  cm (3  s.f.)		
	(c)	Total surface area of packaging		
		$= 2 \times (\frac{1}{2})(\sqrt{9.72})(3.6) + 20.9 \times (3.6 \times 3)$	M1	Award this M1 if prematurely rounded-off value of $h$ (i.e. to 3 s.f. or fewer) is used, provided that the final answer is
		$= 236.944 \text{ cm}^2$		the same as that shown
		$= 237 \text{ cm}^2 (3 \text{ s.f.})$	A1	here.
	~1	1D		Mon The
DI	DUCAT	1014	•	EDUCATIC BI
		30 31 32 33 34 35 36	37 3	8 39
10	(ai)	Mean age of trees		
		$=\frac{30+32+27+29+405+30+28+33+32}{9}$	M1	
		= 71.7778 years = 71.8 years (3 s.f.) or $71\frac{7}{9}$ years	A1	
	(aii)	30 years	B1	
r	(b)	Yes. This is because there is an outlier / extreme value in the data set, which is 405 years old,	B1	Accept: Other reasonable synonyms of 'outlier'. Students need not quote '405' for this B1 to be given.
	EDUC:	and the value of the median is not easily affected by outliers.	B1	Or Reverse Argument: e.g. and the value of the mean is easily affected by outliers.
11	Probability of choosing an almond-flavoured chocolate = $1 - \frac{2}{5} - \frac{17}{50}$			
	+ cnoco	1 = 1 =	M1	
		$=\frac{13}{1}$	A1	
			A1	

		Fig. 5: 22	B1	
	(b)	6 + (n-1)(4)	B1	Also accept alternative forms of the expression $-$ e.g. $2 + 4n$
13	(a)	<i>x</i> = \$1.1903	B1	
		y = \$11.31	B1	
		z = \$6.04	B1	
	(b)	GST for utilities bill = 7% × (66.01 + 17.26 + 11.31 + 6.04 + 7.71) = $\frac{7}{100}$ ×(108.33)	M1	Allow M1 e.c.f. here (but not A1 e.c.f.). Students need not show addition workings for subtotal calculation, for this M1.
		= \$7.58	A1	
14	6		B1	



