Bukit View Secondary School

Secondary One G3

End-of-Year Examination 2024

CANDIDATE NAME			
CLASS/ TEACHING GROUP	/	INDEX NUMBER	

MATHEMATICS

Paper 1

3 October 2024
1 hour 30 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your candidate name, class and index number in the spaces at the top of this page.
Write in dark blue or black pen.
You may use a HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** questions.
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.

At the end of the examination, fasten all your own work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

The maximum number of marks is 50.

For Examiner's use
Marks
50

1 **(a)** Write the following in order of size, starting with the smallest.

$$0.\dot{2}\dot{3}, \quad -0.2, \quad 0.232 \quad -0.23$$

Answer ....., ..., ..., ... [1]

smallest largest

(b) Express $12\frac{3}{4}\%$ as a fraction in its simplest form.

Answer ..... [1]

(c) Convert 20 cm^2 to m^2.

Answer ..... m^2 [1]

---

2 **(a)** Evaluate $\dfrac{\sqrt{41.8}+\pi^2}{3.9-\sqrt[3]{27}}$ with a calculator and write down the first 8 digits.

Answer ..... [1]

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

Answer ..... [1]

3 (a) Write down the coefficient of the x term in $3x^2 - x + 1$.

Answer ..... [1]

(b) The *output* of a function is obtained by subtracting half of the *input* from 3. Using y to represent the *output* and x to represent the *input*, write down the equation of the function.

Answer ..... [1]

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4 Two different sizes of detergent are shown below.

Small size

2.4 litres

$8.30

Large size

4 litres

$12.80

Which size of detergent gives the better value?

Explain and show your working clearly.

Answer

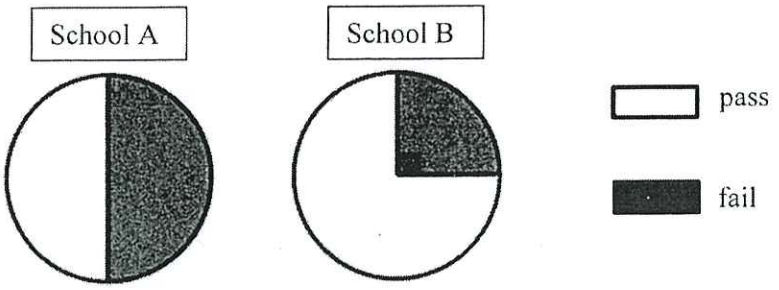
The ..... size detergent gives a better value because .....

..... [2]

5 Express the ratio 0.1 m : 20 cm : 0.8 cm in its simplest form.

Answer ..... : ..... : ..... [2]

6 The pie charts below show the Mathematics exam results of 1G3 students from School A and School B.



For each statement, state whether you agree or disagree and explain your reasons.

	statement	**agree/disagree**	**explanation**	
(i)	Higher percentage of 1G3 students from School B passed the exam than School A			[1]
(ii)	More 1G3 students from School B passed the exam than School A.			[1]
(iii)	School B's 1G3 maths exam paper is easier than School A's.			[1]

7 It is given that $2646 = 2 \times 3^3 \times 7^2$.

(a) Express 180 as the product of its prime factors.

Answer ..... [1]

(b) Find the highest common factor of 180 and 2646.

Answer ..... [1]

(c) It is given that $2646k$ is a perfect square, where k is a positive integer.

Find the smallest possible value of k.

Answer $k =$ ..... [1]

---

8 Express $\frac{1}{2} + \frac{x-3}{3} - \frac{x-4}{4}$ as a single fraction in its simplest form.

Answer ..... [3]

9 Jerry purchased a meal at an original price of \$23.80 in a restaurant.
There is x% discount, and the bill is subjected to 10% service charge and 9% GST. Jerry paid \$17.12 for the final bill.
Calculate the value of x and leave your answer correct to the nearest integer.

Answer $x =$ ..... [4]

10 The first a few terms of a number sequence is given as

4, 11, 18, 25 ...

(a) Write down the next term in the sequence.

Answer ..... [1]

(b) Find an algebraic expression for the nth term in the sequence.

Answer ..... [1]

(c) Explain, with necessary calculations, why 2024 is **not** a term in the sequence.

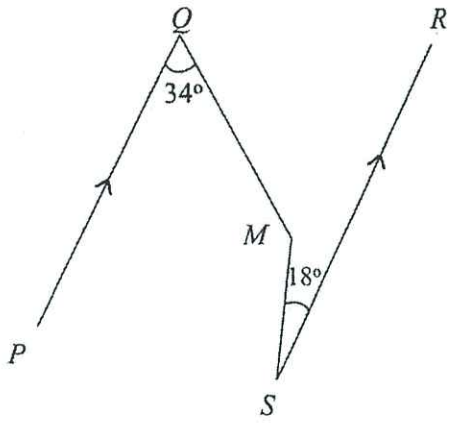
Answer

.....

..... [2]

11 In the diagram, PQ is parallel to RS.

$\angle PQM = 34°$ and $\angle MSR = 18°$.



Calculate reflex $\angle QMS$. Show your working and state any reasons clearly.

Answer:

Answer reflex $\angle QMS =$ ..... ° [3]

12 A group of students participated in a survey to find out the number of hours spent on social media per day. The table below shows the results.

Number of hours	0	1	2	3
Number of students	3	4	7	6

(a) Calculate the average time each student spent on social media per day.

Answer .....hours [2]

(b) The data above are presented using a pie chart. What is the angle of the sector representing the students spending 2 hours per day?

Answer .....° [2]

13 **(a)** Expand and simplify $4[p-(3+2p)]-8q+6p$.

Answer ..... [3]

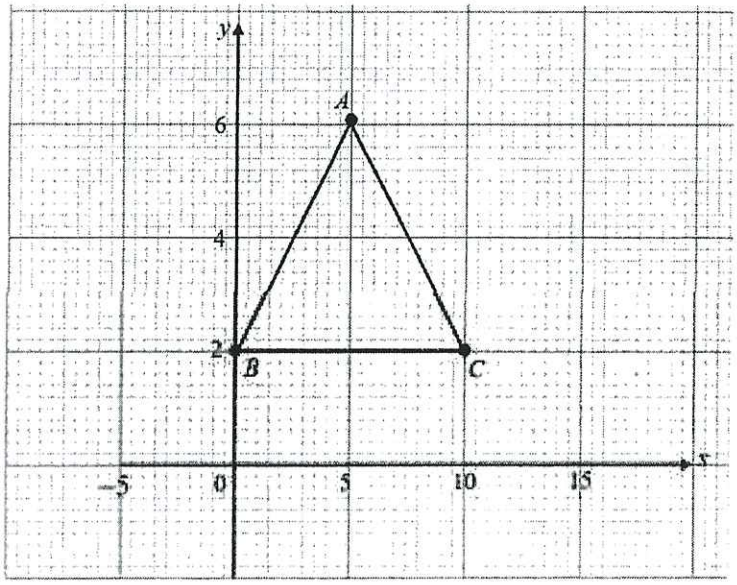
(b) Solve the equation $3(y-2)+8=5-y$.

Answer $y=$ ..... [2]

(c) Factorise $24pq^2-56q^3$ completely.

Answer ..... [1]

14 Triangle ABC is shown below.



(a) Calculate the gradient of AB.

Answer ..... [1]

(b) Hence, write down the equation of AB.

Answer ..... [1]

(c) D has coordinates $(k, 6)$ such that A, B, C and D are the vertices of a parallelogram.

Write down two possible values of k.

Answer $k =$ ..... or ..... [2]

15 The equation of a straight line graph is $3y = -6x + 1$.

(a) $P\ (2, k)$ is a point on the graph.

Find the value of k.

Answer $k =$ ..... [2]

(b) Explain, with necessary calculations, if $Q\ (-1, 2)$ is on the graph.

Answer: [2]

(c) Find the gradient of the straight line.

Answer ..... [1]

End of Paper

Bukit View Secondary School

Secondary One G3

End-of-Year Examination 2024

CANDIDATE NAME			
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MATHEMATICS

Paper 2

4 October 2024
1 hour 30 minutes

Candidates answer on the Question Paper.

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For Examiner's use
Marks
50

1 (a) By rounding each number to 2 significant figures, estimate the value of

$$\frac{364.99 \times \sqrt[3]{26.9}}{0.184}$$

Show your working clearly.

Answer ..... [2]

(b) (i) Write down a prime number that is between 30 to 40.

Answer ..... [1]

(ii) Explain why the number written down in **(i)** is a prime number.

Answer: .....

..... [1]

---

2 (a) Solve $\frac{4x+15}{2} = x-1$.

Answer $x =$ ..... [2]

(b) It is given that $a = \dfrac{b^2 + 1}{c - b}$.

Find the value of a if $b = -1$ and $c = 3$.

Answer $a =$ ..... [1]

---

3 (a) Calculate the sum of the interior angles of an octagon.

Answer ..... ° [1]

(b) In a regular polygon, 7 times of an exterior angle is the same as 2 times of an interior angle.

(i) Calculate the size of each exterior angle.

Answer ..... ° [2]

(ii) Find the number of sides of this regular polygon.

Answer ..... [1]

4 The variables x and y are connected by the equation $y = -2x + 1$.

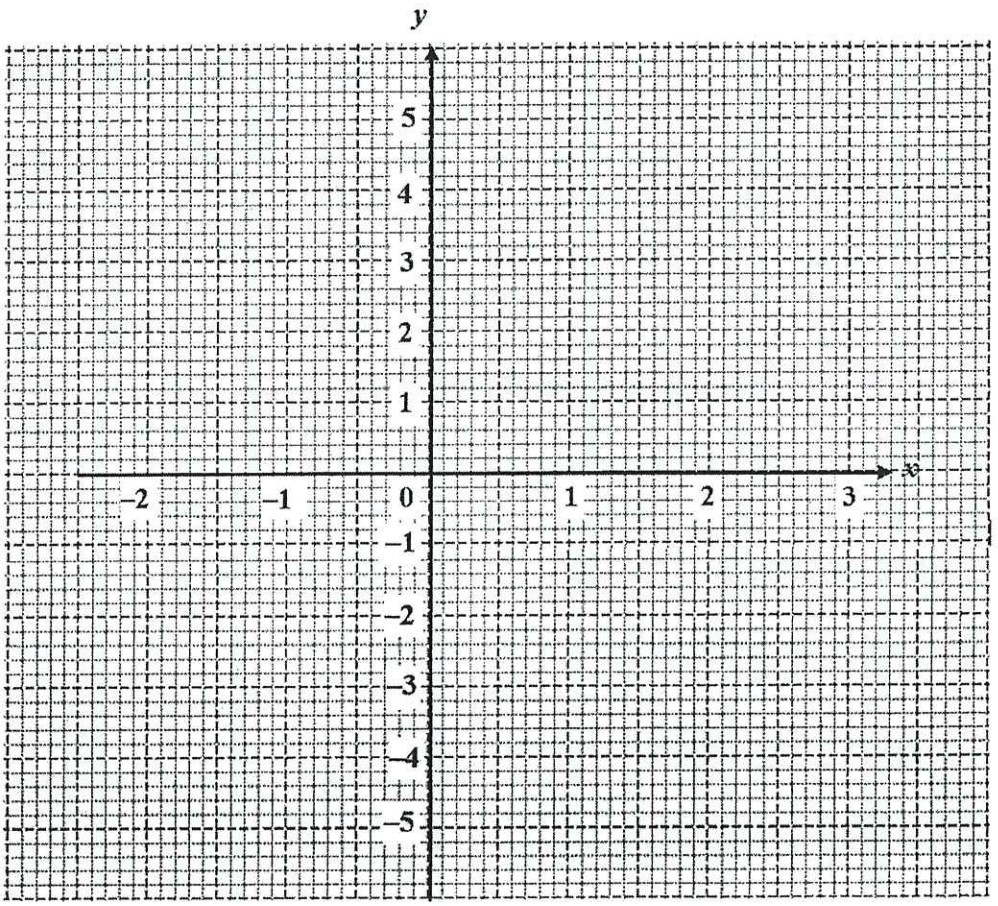
Some corresponding values of x and y are given in the table below.

x	-2	-1	0	1	3
y	5	3	1	-1	k

(i) Find the value of k.

Answer $k =$ ..... [1]

(ii) On the grid provided below, plot the points given in the table and draw the graph of $y = -2x + 1$ for $-2 \leq x \leq 3$. [2]

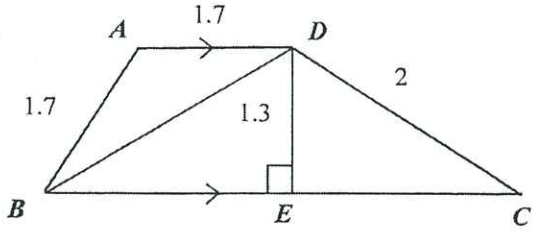


(iii) Use the graph to find the value of y when $x = -1.5$.

Show your working clearly on the graph.

Answer $y =$ ..... [1]

5 In the diagram, the area of trapezium $ABCD$ is 3.9 cm^2. AD is parallel to BC.



It is given that $AB = AD = 1.7$ cm, $CD = 2$ cm and $DE = 1.3$ cm.

(a) Calculate BC.

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

(b) It is also given angle BAD is 130°.

Calculate angle BDE.

Answer angle $BDE =$ .....° [2]

6 David left home at 7 am and jogged to a coffee shop at an average speed of 12 km/h. The distance between his home and the coffee shop is x km.

(i) Write down an algebraic expression, in terms x, for the time taken from his home to the coffee shop.

Answer .....hours [1]

He spent 20 mins having breakfast at the coffee shop, and then walked back home along the same route, at an average speed of 6 km/h.

He reached home at 8 am.

(ii) By forming and solving an equation, find the value of x.

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

7 (a) Ammar plans to purchase a house which is priced at $850,000. However, he only has $600,000 now. He decides to borrow the amount of money he needs from a bank which offers him a simple annual interest rate of 3.2%.
Calculate the total amount of money he needs to pay back in 6 years' time.

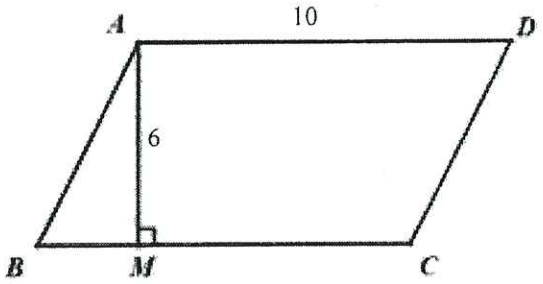
Answer $..... [3]

(b) There are three platforms in a train station.
The trains enter the station at each platform at every 12 minutes, 21 minutes and half an hour respectively.
The operating hours of the station is from 7:30 am to 11:00 pm daily.
Every morning, the trains at all the platforms enter the station at the same time at 7:30 am.
How many **more** times will the trains enter the station together in a day?

Answer ..... [3]

8 **(a)** $ABCD$ is a parallelogram where its perimeter is 36 cm.

AM is perpendicular to BC. $AM = 6$ cm and $AD = 10$ cm.



Calculate the shortest distance from A to the line CD.

Answer ..... cm [3]

(b) The area of a circle is 90 cm^2.

Calculate the circumference of the circle.

Answer ..... cm [3]

9 There is a closed container in the shape of a cuboid with dimensions 80 cm, 24 cm and 64 cm.

(a) Calculate the total surface area of the container.

Answer .....cm^2 [1]

(b) Calculate the volume of the container.

Answer .....cm^3 [1]

A packet of milk is in the shape of a cube with side length of 6 cm.

(c) How many packets of milk can be placed into the container without any damage?

Answer ..... [2]

(d) If milk is poured into the container instead, how many packets are needed to fully fill up the container?

Answer ..... [2]

10 David is a citizen of the United States and he is working in Singapore.

He needs to pay income taxes to **both** the Singapore and the US governments.

The table below shows part of the annual personal income tax rate in Singapore.

Chargeable Income (S$)	Income Tax Rate (%)	Tax Payable (S$)
First 20,000	0	0
Next 10,000	2	200
First 30,000	-	200
Next 10,000	3.50	350
First 40,000	-	550
Next 40,000	7	2,800
First 80,000	-	3,350
Next 40,000	11.5	4,600
First 120,000	-	7,950
Next 40,000	15	6,000
First 160,000	-	13,950
Next 40,000	18	7,200
First 200,000	-	21,150
Next 40,000	19	7,600

The table below shows part of the personal income tax rate by the US Government.

Part of the Chargeable Income (US$)*	Income Tax Rate (%)
0 to 11,000	10
11,001 to 44,725	12
44,726 to 95,375	22
95,376 to 182,100	24
182,101 to 231,250	32

*For example, if a person's chargeable income is US$15,000, he needs to pay 10% tax for the first US$11,000, and 12% tax for the remaining US$4,000.

The exchange rate between Singapore dollars and the US dollars is S$100 to US$76.

(a) Which country offers a more favourable income tax conditions to the people with very low income? Explain briefly with data to support your answer.

Answer:

.....

.....

..... [1]

Based on David's annual chargeable income in 2023, he needs to pay S$8,700 tax to the Singapore Government.

(b) Calculate his annual chargeable income in 2023 and show that this value is $125,000. [2]

(c) David told to his friend that more than 25% of his chargeable income in 2023 was used to pay personal income taxes.

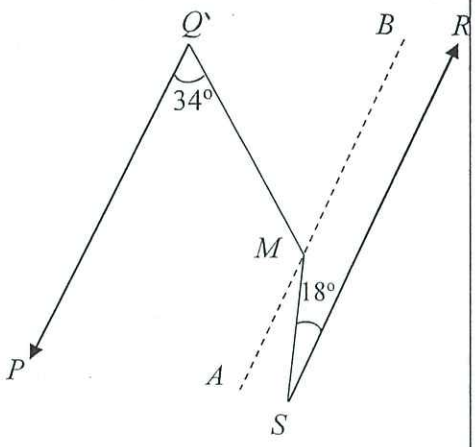
Is he correct? Show your working clearly.

You are reminded that he needs to pay income taxes to both the Singapore and the US government. [6]

End of Paper

		2024 1G3 EOY P1 Marking Scheme	
1	(a)	$-0.23, -0.2, 0.232, 0.\dot{2}\dot{3}$	B1
	(b)	$\frac{51}{400}$	B1
	(c)	$20 \div 100^2 = 0.002\,\text{m}^2$	B1
2	(a)	18.149884	B1
	(b)	18.15	B1 (ecf)
3	(a)	-1	B1
	(b)	$y = 3 - \frac{x}{2}$	B1 (or equivalent)
4	Method 1:		
	small: $8.30 \div 2.4 = \$3.458$ per litre		M1
	large: $12.80 \div 4 = \$3.20$ per litre		
	The large size gives a better value because it is cheaper per litre.		A1
	Method 2:		
	small: $2.4 \div 8.30 = 0.289$ litre/\$		(M1)
	large: $4 \div 12.80 = 0.3125$ litre/\$		
	The large size gives a better value because you can buy more detergent with \$1.		(A1)
	*Accept any other method such as "making the volume the same (eg 12 liters) and compare the cost".		
5	10 cm : 20 cm : 0.8 cm		M1
	50 : 100 : 4		
	25 : 50: 2		A1

6	(i)	agree. 75% from School B passed, while only 50% from School A passed.	B1 (accept $\frac{3}{4}$ and $\frac{1}{2}$)
	(ii)	disagree. The total number of students in each school is not known.	B1
	(iii)	disagree. The difficulty of the paper cannot be determined./Passing rate is also affected by other factors such as students' ability and effort.	B1
7	(a)	$2^2 \times 3^2 \times 5$	B1 (accept $2\times2\times3\times3\times5$)
	(b)	$2\times3^2 = 18$	B1
	(c)	$2\times3 = 6$	B1
8	$\frac{1}{2}+\frac{x-3}{3}-\frac{x-4}{4}$		
	$=\frac{6}{12}+\frac{4(x-3)}{12}-\frac{3(x-4)}{12}$		M1
	$=\frac{6+4(x-3)-3(x-4)}{12}$		
	$=\frac{6+4x-12-3x+12}{12}$		M1
	$=\frac{x+6}{12}$		A1
9	Method 1		
	Before GST: $\frac{17.12}{109}\times100 = \$15.706$		M1
	Before service charge: $\frac{15.706}{110}\times100 = \$14.279$		M1 (ecf, their "15.706")
	$\frac{23.80-14.279}{23.80}\times100\% = 40\%$		M1 (ecf, their "14.279") A1
	Method 2		
	Before discount with SC: $\frac{23.80}{100}\times110 = \$26.18$		(M1)
	Before discount with SC and GST: $\frac{26.18}{100}\times109 = \$28.5362$		(M1, ecf, their "26.18")
	$\frac{28.5362-17.12}{28.5362}\times100\% = 40\%$		(M1, ecf, their "28.5362") (A1)

10	**(a)**	32	B1
	(b)	$-3+7n$	B1 (must simplify) accept $-3+7\times n$ for now
	(c)	Let $-3+7n=2024$	M1 (ecf)
		$7n=2024+3$	
		$n=289\frac{4}{7}$	
		Since n is not a positive integer/whole number, 2024 is not a term in the sequence.	A1
11			
	$\angle BMS=180-18=162°$ (int angles)		M1 (both naming and reason)
	$\angle QMB=34°$ (alt angles)		M1 (both naming and reason)
	reflex $\angle BMS=162+34=196°$		A1 (or B1)
	*proper presentation, such as the drawing of auxiliary line and correct naming of the angles, is required. Students without proper presentation throughout shall get max B1 for the final answer. *For any other method, minus one mark for any missing reason.		
12	**(a)**	total number of students: $3+4+7+6=20$	M1
		$\frac{0\times3+1\times4+2\times7+3\times6}{20}=1.8$	A1
	(b)	$\frac{7}{20}\times360=126°$	M1 (for "$\frac{7}{20}$" or "$\times360$") A1

13	**(a)**	Method 1	
		$4[p-(3+2p)]-8q+6p$	
		$=4[p-3-2p]-8q+6p$	M1
		$=4[-3-p]-8q+6p$	
		$=-12-4p-8q+6p$	M1 (ecf)
		$=-12+2p-8q$	A1
		Method 2	
		$4[p-(3+2p)]-8q+6p$	
		$=4p-4(3+2p)-8q+6p$	(M1)
		$=4p-12-8p-8q+6p$	(M1, ecf, for negative coefficient expansion)
		$=-12+2p-8q$	(A1)
	(b)	$3(y-2)+8=5-y$.	
		$3y-6+8=5-y$	
		$3y+2=5-y$	M1
		$3y+y=5-2$	
		$4y=3$	
		$y=\frac{3}{4}$	A1
	(c)	$24pq^2-56q^3$	
		$=8q^2(3p-7q)$	B1
14	**(a)**	$\frac{4}{5}$	B1
	(b)	$y=\frac{4}{5}x+2$	B1 (ecf for "their gradient")
	(c)	-5 or 15	B2

15	**(a)**	$3k = -6(2)+1$	M1 (accept $3y = -6(2)+1$)
		$3k = -11$	
		$k = -\frac{11}{3}$	A1
	(b)	Method 1:	
		$LHS = 3(2) = 6$	M1
		$RHS = -6(-1)+1 = 7$	
		Since $LHS \neq RHS$, Q is not on the graph.	A1
		Method 2:	
		When $x = -1$	(M1)
		$3y = -6(-1)+1$	
		$y = \frac{7}{3}$	
		Since $y \neq 2$, Q is not on the graph.	(A1)
	(c)	-2	B1

		2024 1G3 EOY P2 Marking Scheme		
1	(a)	$\dfrac{364.99\times\sqrt[3]{26.9}}{0.184}$		
		$=\dfrac{360\times\sqrt[3]{27}}{0.18}$		M1 (for at least two correct values) not accepting 360.0, 0.180.
		$=6000$		A1
	(b)	(i)	31 or 37	B1
		(ii)	The number can only be divided by 1 and itself.	B1
2	(a)	$\dfrac{4x+15}{2}=x-1$		
		$4x+15=2(x-1)$		M1
		$4x+15=2x-2$		
		$2x=-17$		
		$x=-8.5$		A1
	(b)	$a=\dfrac{(-1)^2+1}{3-(-1)}$		
		$a=0.5$		B1
3	(a)	$(8-2)\times180°$		
		$=1080°$		B1
	(b)	(i)	ext angle: 2u	
			int angle: 7u	
			1u: $\dfrac{180°}{9}=20°$	M1
			2u: $20°\times2=40°$	A1
		(ii)	$\dfrac{360}{40}=9$	B1 (or 360 divide by "their (b)(i)" and answer is a whole number)

4	**(i)**	$k = -5$	B1
	(ii)	At least 4 correct points	B1
		Straight line graph passing through all 5 points.	B1
	(ii)	4 (± 0.1)	B1 (with working on the graph, dotted line)
5	**(a)**	Method 1:	
		$\frac{1}{2}(1.7 + BC)(1.3) = 3.9$	M1 (application of area of trapezium formula)
		$1.7 + BC = 6$	
		$BC = 4.3$	A1
		Method 2:	
		$3.9 \div \frac{1}{2} \div 1.3 = 6$	(M1)
		$6 - 1.7 = 4.3$	(A1)
		*no proper working, or guess and check, are not allowed. Award zero mark.	
	(b)	$\angle ADB = \frac{180 - 130}{2} = 25°$	M1
		$\angle BDE = 90 - 25 = 65°$	A1
6	**(i)**	$\frac{x}{12}$	B1 (accept $x \div 12$ for now)
	(ii)	$\frac{x}{12} + \frac{1}{3} + \frac{x}{6} = 1$	M1 (can be given for wrong unit used, $\frac{x}{12} + 20 + \frac{x}{6} = 60$, for now)
		$\frac{x + 4 + 2x}{12} = 1$	M1
		$\frac{3x + 4}{12} = 1$	
		$3x + 4 = 12$	
		$x = \frac{8}{3}$ or $2\frac{2}{3}$	A1 (accept 2.67 for now)

7	(a)	\$ needed: $850000-600000=\$250000$	
		interest: $250000\times3.2\%\times6$	M1
		$=\$48000$	A1
		total: $48000+250000=\$298000$	A1
	(b)	LCM: $2^2\times3\times5\times7$	M1 (prime factorisation of 3 numbers, or ladder method to the end, or any other correct method in finding LCM)
		$=420$	A1
		from 7:30am to 11:00pm: $15.5\times60=930$ min	
		$\frac{930}{420}=2\frac{3}{14}\approx2$	A1
		*Listing and correct answer: 1 mark.	
8	(a)	Area: $6\times10=60\,\text{cm}^2$	M1
		$CD=\frac{36}{2}-10=8\,\text{cm}$	B1
		$\frac{60}{8}=7.5\,\text{cm}$	A1
	(b)	$\pi r^2=90$	M1
		$r^2=\frac{90}{\pi}$	
		$r=\sqrt{\frac{90}{\pi}}$ (5.35237)	A1
		$2\pi r=2\pi\sqrt{\frac{90}{\pi}}=33.6$ cm	A1

9	**(a)**	$(80\times 24+80\times 64+24\times 64)\times 2=17152\ \text{cm}^2$	B1
	(b)	$80\times 24\times 64=122880\ \text{cm}^3$	B1
	(c)	$\frac{80}{6}=13\frac{1}{3}$	M1
		$\frac{24}{6}=4$	
		$\frac{64}{6}=10\frac{2}{3}$	
		$13\times 4\times 10=520$	A1
	(d)	$6^3=216\ \text{cm}^3$	B1
		$\frac{122880}{216}=568\frac{8}{9}\approx 569$	B1 (full mark can be given even if part of working is in (c))
10	**(a)**	Singapore. For the people with very low income, there is no income tax. While for the US, the low income group still need to pay 10% tax.	B1 (or any other example with data)
	(b)	$8700-7950=750$	
		$750\div 15\%=5000$	M1
		$5000+120000=125000$	A1
		*Zero mark is given if student uses 125000 in calculation, instead of calculate the chargeable income.	

	(c)	income in US$:	
		$\frac{125000}{100}\times 76 = 95000$	M1
		*US tax in US$ for 0 to 11000:	M1 (for any one of the three)
		$11000\times 10\% = 1100$	
		*US tax in US$ for 11001 to 44725:	
		$(44725-11000)\times 12\% = 4047$	
		*US tax in US$ for 44726 to 95000:	
		$(95000-44725)\times 22\% = 11060.50$	
		Total US tax in US$:	
		$1100+3993+11060.50 = 16207.50$	A1 (no ecf)
		Method 1: covert to S$	
		total US tax in S$	
		$\frac{16207.50}{76}\times 100 = 21325.65789$	M1 (ecf, with working)
		%tax of total income	
		$\frac{21325.65789+8700}{125000}\times 100\%$	M1 (ecf, for adding the two components, and then divide by 125000 with times 100%) (or $125000\times 25\% = 31250$)
		$= 24.0\% < 25\%$, so he is not correct.	A1, can be given only if 24.0%] (or $21325.65789+8700 = 30025.66 < 31250$) (no ecf)
		Method 2: covert to US$	
		SG tax in US$	
		$\frac{8700}{100}\times 76 = 6612$	[M1]
		%tax of total income	
		$\frac{16207.5+6612}{95000}\times 100\%$	[M1] (ecf, for adding the two components in USD, and then divide by their chargeable income in USD, with times 100%) (or $95000\times 25\% = 23750$)
		$= 24.0\% < 25\%$, so he is not correct.	[A1, can be given only if 24.0%] (or $16207.5+6612 = 22819.50 < 23750$) (no ecf)