SWISS COTTAGE SECONDARY SCHOOL
SECONDARY ONE EXPRESS
SECOND SEMESTRAL EXAMINATION

E

Name: _____ ( ) Class: _____

MATHEMATICS

4048/01

Paper 1

Tuesday 3 October 2017

1 hour 15 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

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** the 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.
Electronic Calculators are **NOT ALLOWED** in this paper.
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.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 50.

For Examiner's use
50

This document consists of **8** printed pages.

Setter: Mr Wilson Wee
Vetter: Ms Tan Hui Lan

[Turn over

Answer **all** the questions.

1 State all the irrational number(s) from the following list.

$$\frac{2}{3},\quad \pi,\quad \sqrt[3]{5},\quad \frac{22}{7},\quad 0.0053$$

Answer ..... [1]

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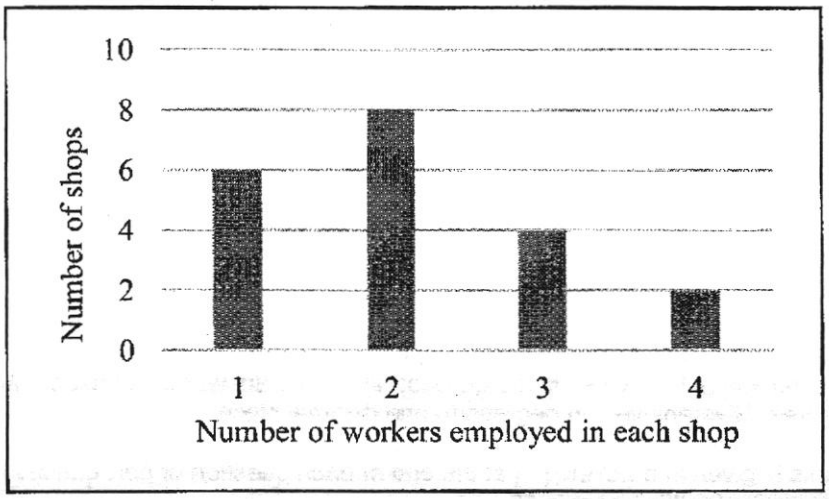
2 A survey was conducted on 20 shops to find the number of workers they employ. The results of the survey are shown in the bar chart below.



Calculate

(a) the percentage of shops with more than 2 workers,

Answer ..... % [2]

(b) the total number of workers employed in all 20 shops.

Answer ..... workers [2]

---

3 Written as the product of its prime factors, $375 = 3 \times 5^3$.

(a) Express 90 as the product of its prime factors.

Answer ..... [1]

(b) Hence write down

(i) the LCM of 375 and 90, giving your answer as the product of its prime factors,

Answer ..... [1]

(ii) the greatest integer that will divide both 375 and 90 exactly.

Answer ..... [1]

---

4 The stem and leaf diagram below shows the waiting times, in minutes, of some patients in a clinic.

Stem	Leaves
1	5 6
2	0 1 3 7 8
3	0 2 2 2 6
4	1 2 5

Key: 1 | 5 represents 15 minutes

(a) Find the total number of patients at the clinic.

Answer ..... patients [1]

(b) For these times, find

(i) the mode,

Answer ..... minutes [1]

(ii) the median.

Answer ..... minutes [1]

---

5 By rounding off each number to 1 significant figure, estimate $\frac{6.29 \times 20.6}{4.12}$.

Answer ..... [2]

---

6 Each year, the value of a painting increases by 10%. If the value of the painting was \$12100 in 2016, find its value in 2014.

Answer \$ ..... [3]

---

7 Given that $a = 2$ and $b = -3$, evaluate $\frac{b^3 - 3a}{4ab}$.

Answer ..... [2]

---

8 Daisy bought 20 cartons of eggs. There were x eggs in each carton.

(a) Write down an expression, in terms of x, for the number of eggs she bought.

Answer ..... [1]

(b) When the cartons were opened, she found that y eggs were broken. She placed the unbroken eggs equally into 30 baskets. Write an expression, in terms of x and y, for the number of eggs in each basket.

Answer ..... [1]

---

9 Subtract $3x^2 - 6x + 2$ from $5x^2 - 4x - 3$.

Answer ..... [2]

---

10 Simplify $\frac{2x-5y}{3} + \frac{2x-3y}{4}$.

Answer ..... [3]

---

11 Factorise the following completely.

(a) $35ax - 5ay$

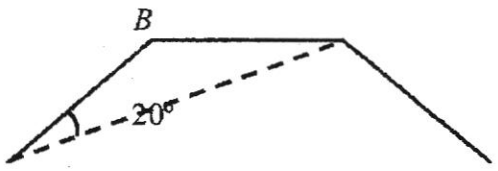
Answer ..... [1]

(b) $2ax + 6bx - ay - 3by$

Answer ..... [2]

---

12 AB, BC and CD are adjacent sides of a regular polygon and $\angle BAC = 20°$.



(a) Calculate the exterior angle of the polygon.

Answer ..... [2]

(b) Calculate $\angle ACD$.

Answer ..... [2]

---

13 Worker A can paint a room in 2 hours. Worker B can paint the same room in 4 hours.

Find the time it will take for the room to be painted if both workers paint at the same time.

Answer ..... hours [3]

---

14 Betty earns 3 times as much as Nick and Nick earns \$200 more than Alfred.
If Nick earns \$$x$,

(a) write down an expression, in terms of x, for

(i) Alfred's earnings,

Answer \$ ..... [1]

(ii) Betty's earnings,

Answer \$ ..... [1]

(iii) the sum of Betty, Nick and Alfred's earnings.

Answer \$ ..... [2]

(b) If the sum of all their earnings is \$8800, find Nick's earnings.

Answer \$ ..... [2]

---

15 A group of people was asked how many siblings they have in their family.

The results of this survey are summarised in the table below.

Number of siblings	0	1	2	3	4
Frequency	5	10	x	4	1

(a) If the mode is 1, write down the largest possible value of x.

Answer ..... [1]

(b) If the median is 2, write down the smallest possible value of x.

Answer ..... [1]

(c) If the mean is 1.5, calculate the value of x.

Answer ..... [2]

---

16 Answer this whole question on a sheet of graph paper.

The variables x and y are connected by the equation $y = 3 - 3x$.
Some corresponding values of x and y are given in the table below.

x	−3	−2	−1	0	1	2	3
y	12	a	6	3	0	−3	−6

(a) Find the value of a. [1]

(b) Using a scale of 2 cm to represent 1 unit, draw a horizontal x-axis for $-3 \le x \le 3$. [3]
Using a scale of 1 cm to represent 1 unit, draw a vertical y-axis for $-6 \le y \le 12$.
On your axis, plot the points given in the table and join them with a straight line.

(c) Use your graph to find the value of x when $y = 8$. [1]

END OF PAPER

SWISS COTTAGE SECONDARY SCHOOL
SECONDARY ONE EXPRESS
SECOND SEMESTRAL EXAMINATION

E

Name: _____ ( ) Class: _____

MATHEMATICS

4048/02

Paper 2

Monday 09 October 2017

1 hour 15 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

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** the 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.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 50.

For Examiner's use
50

This document consists of **10** printed pages.

Setter: Ms Leung Yan Ru
Vetter: Ms Tan Hui Lan

[Turn over

Answer **all** the questions.

1 A regular polygon has interior angles of 156°.

Find the number of sides of the polygon.

Answer ..... [2]

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2 Evaluate the following, giving your answers to 3 significant figures.

(a) $\dfrac{\left(-\frac{2}{3}\right)^3}{7.2386-2.3412}$,

Answer ..... [1]

(b) $\sqrt{2}+3\sqrt{5}-1.273$.

Answer ..... [1]

---

3 Consider the number sequence 7, 4, 1, −2, −5, ..., ...,

Write down

(a) the next two terms,

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

(b) an expression for the nth term,

Answer $T_n =$ ..... [1]

(c) the 53th term.

Answer ..... [1]

---

4 Jack packs 726 boxes of chocolates, 660 bottles of wine and 693 tins of cookies into gift hampers.
Each gift hamper contains an equal number of chocolates, wine and cookies.

Find the greatest possible number of gift hampers he could pack.

Answer ..... [2]

---

5 Two telecommunications service providers, Star Mobile and Sing Mobile offer the following mobile price plans for a 32 GB jphone 7.

Star Mobile Combo 3	**Sing Mobile 4G3**
3GB data/200 minutes outgoing talktime	3GB data/200 minutes outgoing talktime
jphone price $378	jphone price $561
Subscription rate $62.90/month	Subscription rate $42.90/month

*mobile price plans are valid for 2 years

Which service provider offers a mobile price plan which is more value for money?
Support your answer with valid mathematical working.

Answer ..... [3]

---

6 (a) Solve $\frac{5x}{3} > 1.2 + \frac{2x}{11}$.

Answer ..... [2]

(b) Hence, write down the smallest prime number x which satisfies $\frac{5x}{3} > 1.2 + \frac{2x}{11}$.

Answer Smallest Prime = ... [1]

---

7 In 2015, a supermarket employs 168 workers consisting of shelf stockers, cashiers, managers in the ratio of 7: 4: 3.

(a) Find the number of cashiers employed in 2015.

Answer ..... [2]

(b) The number of managers employed in 2015 is 20% more than in 2014.

Find the number of managers employed in 2014.

Answer ..... [2]

---

8 Solve

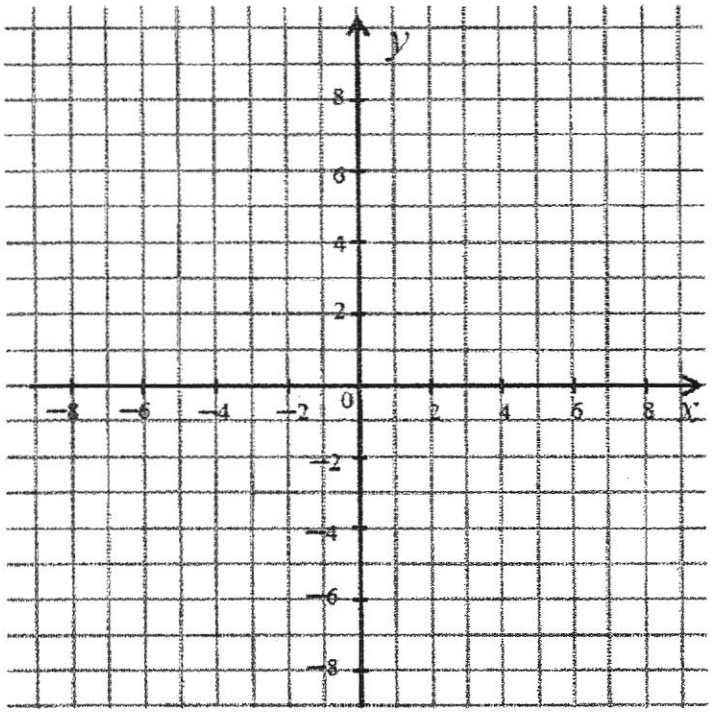
(a) $2(5x+13)=3(x+1)+2,$

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

(b) $\frac{4y}{5}-\frac{2y+1}{3}=\frac{1}{7}.$

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

9 **(a)** Plot the points of the trapezium $ABCD$, where the ordered pairs are $A(-3, 6)$, $B(5, 6)$, $C(7, -3)$, $D(-7, -3)$ on the grid below. [2]



(b) Find the gradient of AD.

Answer ..... [2]

(c) Calculate the area of trapezium $ABCD$.

Answer ..... units^2 [2]

10 An athlete taking part in a dualthlon runs a distance of 800 m at an average speed of 6 km/h. He stops to rest for 10 minutes before he cycles a further distance of 2 km in 12 minutes.

Calculate

(a) the time, in minutes, he takes to run the distance of 800 m,

Answer ..... minutes [2]

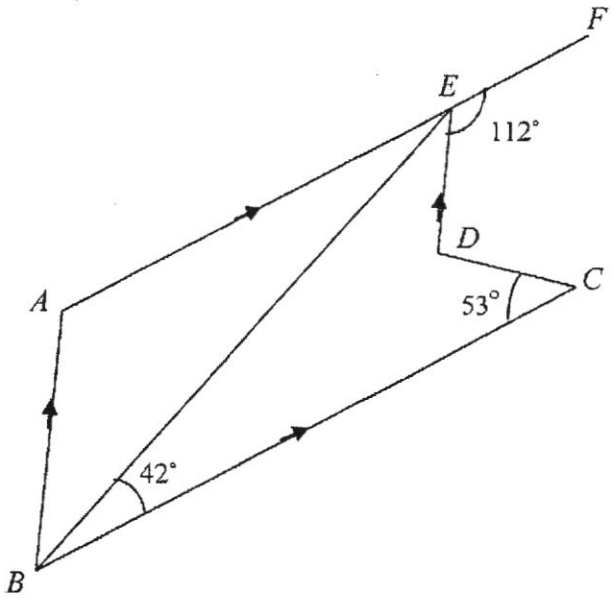
(b) his cycling speed in km/h,

Answer ..... km/h [2]

(c) his average speed for the whole race.

Answer ..... km/h [2]

11



In the diagram, AF is parallel to BC and AB is parallel to DE.
AEF is a straight line.
Angle $CBE = 42°$, angle $BCD = 53°$ and angle $DEF = 112°$.

Stating your reasons clearly, find

(a) angle EAB,

Answer Angle EAB = ... [1]

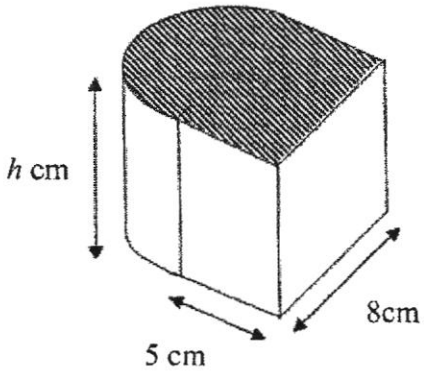
(b) angle BED,

Answer Angle BED = ... [2]

(c) reflex angle EDC.

Answer Reflex Angle EAB = ... [3]

12

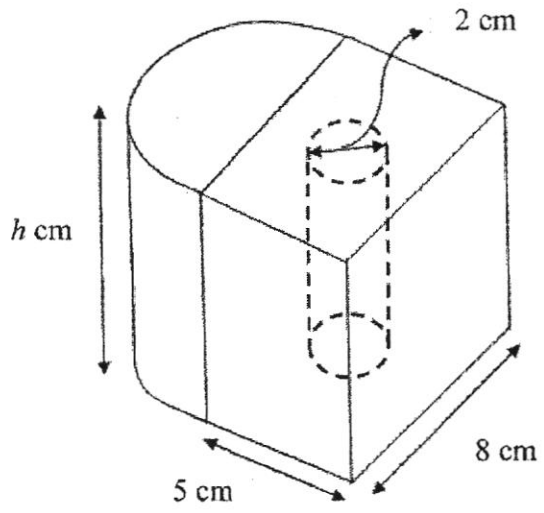


The diagram shows a prism with a cross section that consists of a semicircle and a rectangle with dimensions 8 cm by 5 cm.
The prism has a height of h cm.

(a) Calculate the cross sectional area of the solid.

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

(b)



A round cylindrical hole with a diameter of 2 cm is removed from the cuboid to form the artifact as shown above.

(i) Given that the volume of the artifact is 560 cm^3, show that $h = 9.034$ cm correct to four significant figures. [3]

Answer

(ii) Hence, find the total surface area of the artifact.

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

END OF PAPER

Marking Scheme for Math 1E SA2 P1 2017

Qn	Marking Point	Marks Awarded	Remarks
1a	π, $\sqrt[3]{5}$	**B1**	
2a	Percentage $= \frac{6}{20} \times 100\%$ $= 30\%$	**M1** **A1**	
2b	Total number $= 1 \times 6 + 2 \times 8 + 3 \times 4 + 4 \times 2$ $= 42$	**M1** **A1**	
3a	2| 90 3| 45 3| 15 5| 5 1 $90 = 2 \times 3 \times 3 \times 5 = 2 \times 3^2 \times 5$	**B1**	
3bi	$375 = 3 \times 5 \times 5 \times 5$ $90 = 2 \times 3 \times 3 \times 5$ LCM $= 2 \times 3 \times 3 \times 5 \times 5 \times 5$ $= 2 \times 3^2 \times 5^3$	**B1**	
3bii	HCF $= 3 \times 5$ $= 15$	**B1**	
4a	15 patients	**B1**	
4bi	32 minutes	**B1**	
4bii	30 minutes	**B1**	
5	$\frac{6.29 \times 20.6}{4.12}$ $\approx \frac{6 \times 20}{4}$ $= 30$	**M1** **A1**	
6	Value of painting in 2015 $= \frac{100}{110} \times 12100$ $= \$11000$ Value of painting in 2014 $= \frac{100}{110} \times 11000$ $= \$10000$	**M1** **M1** **A1**	

7	$\frac{b^3-3a}{4ab}$ $=\frac{(-3)^3-3(2)}{4(2)(-3)}$ $=\frac{-27-6}{-24}$ $=\frac{-33}{-24}$ $=1\frac{3}{8}$	**M1** **A1**	Evaluation of b^3
8a	No. of eggs in each carton $= x$ No. of eggs bought $= 20 \times x$ $= 20x$	**B1**	
8b	No. of eggs broken $= y$ No. of eggs unbroken $= 20x - y$ No. of eggs in each basket $= \frac{20x-y}{30}$	**B1**	
9	$5x^2-4x-3-(3x^2-6x+2)$ $=5x^2-4x-3-3x^2+6x-2$ $=2x^2+2x-5$	**M1** **A1**	Form expression
10	$\frac{2x-5y}{3}+\frac{2x-3y}{4}$ $=\frac{4(2x-5y)}{12}+\frac{3(2x-3y)}{12}$ $=\frac{4(2x-5y)+3(2x-3y)}{12}$ $=\frac{8x-20y+6x-9y}{12}$ $=\frac{14x-29y}{12}$	**M1** **M1** **A1**	Converting both fractions to same denominator Expansion of expressions

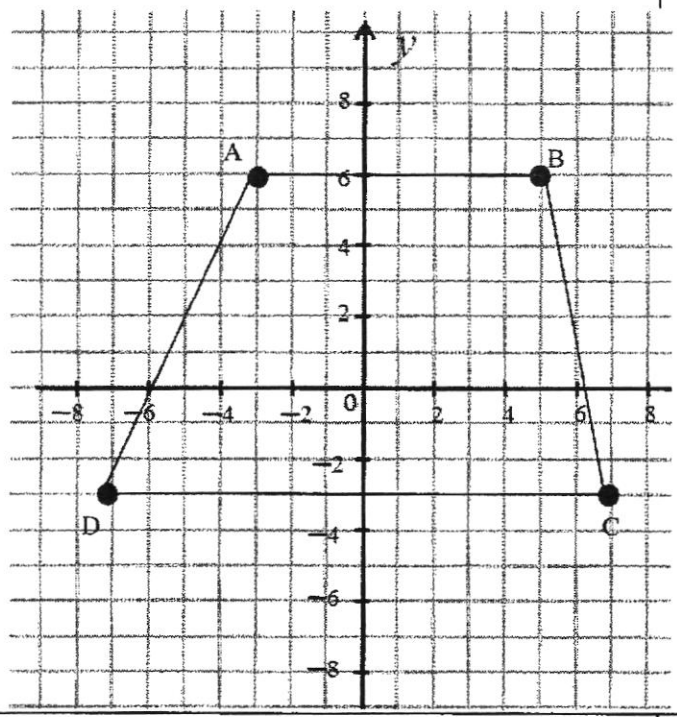
11a	$5a(7x-y)$	**B1**	
11b	$2ax+6bx-ay-3by$ $=2x(a+3b)-y(a+3b)$ $=(2x-y)(a+3b)$	**M1** **A1**	
12a	$\angle BCA = 20°$ (base $\angle$s of isos. triangle) Exterior angle $= 20° + 20°$ (ext $\angle$ = sum of int. opp. $\angle$s) $= 40°$	**M1** **A1**	
12b	Interior angle $= 180° - 40°$ ($\angle$s sum of triangle) $= 140°$ $\angle ACD = 140° - 20°$ $= 120°$	**M1** **A1**	
13	In 1 hour, fraction of the room painted $=\frac{1}{2}+\frac{1}{4}$ $=\frac{2}{4}+\frac{1}{4}$ $=\frac{3}{4}$ $\frac{3}{4}$ room painted in 1 hr $\frac{4}{4}$ room painted in $\frac{1}{3}\times 4$ hrs $=1\frac{1}{3}$ hrs	**M1** **M1** **A1**	
14ai	Alfred's earnings $= \$(x-200)$	**B1**	
14aii	Betty's earnings $= \$3x$	**B1**	
14aiii	Sum of Betty, Nick and Alfred's earnings $=3x+x+(x-200)$ $=\$(5x-200)$	**M1** **A1**	
14b	Since the sum of all their earnings is \$8800, $5x-200=8800$ $5x=9000$ $x=1800$ Hence, Nick's earnings is \$1800.	**M1** **A1**	

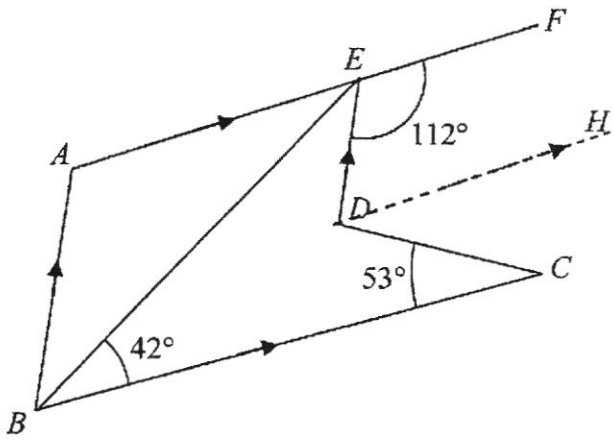
15a	9	**B1**	
15b	$5+10=(x-1)+4+1$ $15=x+4$ $x=11$	 **B1**	
15c	$\frac{0\times5+1\times10+2\times x+3\times4+4\times1}{5+10+x+4+1}=1.5$ $\frac{2x+26}{x+20}=1.5$ $2x+26=1.5(x+20)$ $2x+26=1.5x+30$ $0.5x=4$ $x=8$	**M1** **A1**	
16a	9	**B1**	
16b	As shown in attached graph.	**B1** **B1** **B1**	Correct scale used on both axes. Correct plotting of points. Straight line passing through all points.
16c	-1.7	**B1**	Accept answers from -1.6 to -1.8

Marking Scheme for Math 1E SA2 P2 2017

Qn	Marking Point	Marks Awarded	Remarks
1	$\frac{(n-2)\times 180°}{n} = 156°$ $180n - 360 = 156n$ $180n - 156n = 360$ $24n = 360$ $n = \frac{360}{24}$ $n = 15$	M1 A1	
2(a)	$\frac{\left(-\frac{2}{3}\right)^3}{7.2386 - 2.3412} = -0.060500 \approx -0.0605$	B1	
2(b)	$\sqrt{2} + 3\sqrt{5} - 1.273 = 6.8494 \approx 6.85$	B1	
3(a)	-8, -11	B1	
3(b)	Tn = $10 - 3n$	B1	
3(c)	T53 = $10 - 3(53) = -149$	B1	
4	2 | 660 2 | 330 3 | 165 5 | 55 11 | 11 | 1 $660 = 2^2 \times 3 \times 5 \times 11$	M1	
	2 | 726 3 | 363 11 | 121 11 | 11 | 1 $726 = 11^2 \times 3 \times 2$		
	3 | 693 3 | 231 7 | 77 11 | 11 | 1 $693 = 3^2 \times 7 \times 11$		
	Greatest possible number of hampers $= 3 \times 11$ $= 33$	A1	
5	Total price of iphone from Singtel $= 378 + 62.90 \times 24 = \$1887.60$ Total price of iphone from Starhub $= 561 + 42.90 \times 24 = \$1590.60$ Starhub is more value for money.	M1 M1 A1	

6(a)	$\frac{5x}{3} > 1.2 + \frac{2x}{11}$ $\frac{5x}{3} - \frac{2x}{11} > 1.2$ $\frac{55x-6x}{33} > 1.2$ $49x > 39.6$ $x > \frac{39.6}{49}$ $x > 0.80816$	**M1 or** **M1** **A1**	
6(b)	smallest prime number of $x = 2$	**B1**	Must follow hence.
7(a)	Cashiers $= \frac{168}{3+4+7} \times 4$ $= 48$	**M1** **A1**	
7(b)	Managers in 2015 $= \frac{168}{3+4+7} \times 3$ $= 36$ Managrs in 2014 $= \frac{36}{120} \times 100 = 30$	**M1** **A1**	
8(a)	$2(5x+13) = 3(x+1)+2$ $10x+26 = 3x+3+2$ $7x = -21$ $x = -3$	**M1** **A1**	
8(b)	$\frac{4y}{5} - \frac{2y+1}{3} = \frac{1}{7}$ $\frac{3(4y)-5(2y+1)}{15} = \frac{1}{7}$ $\frac{12y-10y-5}{15} = \frac{1}{7}$ $\frac{2y-5}{15} = \frac{1}{7}$ $7(2y-5) = 15$ $14y-35 = 15$ $14y = 50$ $y = \frac{50}{14}$	**M1 (awarded for correct denominator and numerator)** **M1 (awarded for correct cross factorization)** **A1**	

9(a)		**B2**	B1 for 2 correct ordered pairs.
9(b)	Gradient $= \frac{9}{4}$ $=2.25$	**M1** **A1**	
9(c)	Area $= \frac{1}{2} \times 9 \times (8 + 14)$ $= 99$ units^2	**M1** **A1**	
10(a)	800 m = 0.8 km Time taken $= \frac{0.8}{6} \times 60$ = 8 minutes	**M1** **A1**	
10(b)	Cycling Speed $= \frac{2}{12 \div 60}$ = 10 km/h	**M1** **A1**	
10(c)	Average speed $= \frac{0.8+2}{\frac{8}{60}+\frac{10}{60}+\frac{12}{60}}$ = 5.6 km/h	**M1** **A1**	
11(a)	$\measuredangle EAB = 112°$ (corresponding angle, AE parallel to BC)	**B1**	
11(b)	$\measuredangle ABE = 180° - 112° - 42° = 26°$ (corresponding angle, AB parallel to ED) $\measuredangle BED = 26°$ (alternate angle, AB parallel to ED)	**M1** **A1**	
11(c)			

	 Construct DH parallel to EF $\measuredangle EDH = 180° - 112° = 68°$ (interior angle, EF parallel to DH) $\measuredangle HDC = 53°$ (alternate angle, EF parallel to DH) Obtuse $\measuredangle EDC = 53° + 68° = 121°$ Reflex $\measuredangle EDC = 360° - 121°$ $= 239°$ (angles at a point)	**M1** **M1** **A1**	
12(a)	Cross Sectional Area $= 8 \times 5 + \frac{1}{2} \times \pi \times 4^2$ $=65.132$ $\approx 65.1\ cm^2$	**M1** **A1**	
12(bi)	Volume of original figure $= 65.132h\ cm^3$ Volume of cylinder $= \pi \times 1^2 \times h$ $= h\pi\ cm^3$ $560 = 65.132h - h\pi$ $560 = h(65.132 - \pi)$ $h = \frac{560}{65.132 - \pi}$ $h = 9.03365 \approx 9.034cm$	**M1** **M1** **A1**	
12(bii)	Circumference of semicircle $= \frac{1}{2} \times 2 \times \pi \times 4$ $=12.566$ cm Perimeter of base $= 12.566 + 5 + 8 + 5$ $=30.566$ cm Original surface area $= 30.566 \times 9.034 + 2 \times 65.132$ $= 406.397\ cm^2$	**M1**	

	Total surface area of artefact $= 406.397 - 2\times \pi \times 1^2 + 2\times \pi \times 1 \times 9.034$ $=456.87$ $\approx 457\ cm^3$	**M1** **A1**	