Class	Register No	Name

Bukit Merah Secondary School
End-of-Year Examination 2015
Secondary 2 Express

E

MATHEMATICS

1 Oct 2015

Paper 1

1 hour 15 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your class, register number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, 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.
Calculators should be used when 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.

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**.

Calculator Model:

For Examiner's Use

This document consists of **13** printed pages.

106

[TURN OVER

trendyline

Downloaded from SingaKids.com

Answer **all** the questions

For Examiner's use

1 **Use a calculator** to evaluate the following correct to the number of decimal places or significant figures required.

(a) $\dfrac{\sqrt{778.2}+568}{\sqrt[3]{834.4}}$ [2 decimal places]

(b) $(0.14)^3+\dfrac{(0.65)^2}{\sqrt{7-1\frac{4}{9}}}$ [4 significant figures]

Answer *(a)* ..... **[1]**

(b) ..... **[1]**

For Examiner use

trendyline

Downloaded from SingaKids.com

For Examiner's use

2 Given that $2016 = 2^5 \times 3^2 \times 7$ and $3240 = 2^3 \times 3^4 \times 5$, find

(a) the smallest integer that is a multiple of both 2016 and 3240,

(b) the smallest possible integer k such that $2016k$ is a perfect cube.

Answer *(a)* ..... **[1]**

(b) k = ... **[1]**

For Examiner use

3 Joseph drives at $(2x + 5)$ km/h for 3 hours. He then rested for 1 hour.

If his average speed for the whole journey is $\frac{13}{8}x$ km/h, find the value of x.

Answer x = ... **[2]**

107

trendyline

Downloaded from SingaKids.com

For Examiner's use

4 **(a)** Expand and simplify the following expression,

$50a^2 - (7a - 4b)^2$

(b) Factorise the following expressions completely.

(i) $64c^2 - 25d^2$

(ii) $32pr - 28qr + 21sq - 24sp$

For Examiner use

Answer *(a)* ..... **[2]**

(b) *(i)* ..... **[1]**

(ii) ..... **[2]**

trendyline

Downloaded from SingaKids.com

For Examiner's use

5 Suppose that 6 cm on a map represents an actual distance of 15 km.

For Examiner use

(a) Express the scale in the form $1 : r$.

(b) The length of an underground tunnel measures 2.8 km.
Calculate the length of the underground tunnel on the map in cm.

(c) The area of a town measures 13.4 cm^2 on the map.
Find the actual area of the town in km^2.

Answer *(a)* ..... **[1]**

(b) .....cm **[1]**

(c) .....km^2 **[2]**

168

trendyline

Downloaded from SingaKids.com

For Examiner's use

6 Solve each of the following equations.

(a) $6x^2 + 18x = 0$

(b) $4x^2 - 24x + 35 = 0$

Answer *(a)* $x =$ ..... *or* ..... **[2]**

(b) $x =$ ..... *or* ..... **[2]**

7 Solve the following simultaneous equations.

$4x + 5y = -9$

$-3x + 7y = 39$

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

$y =$ .....

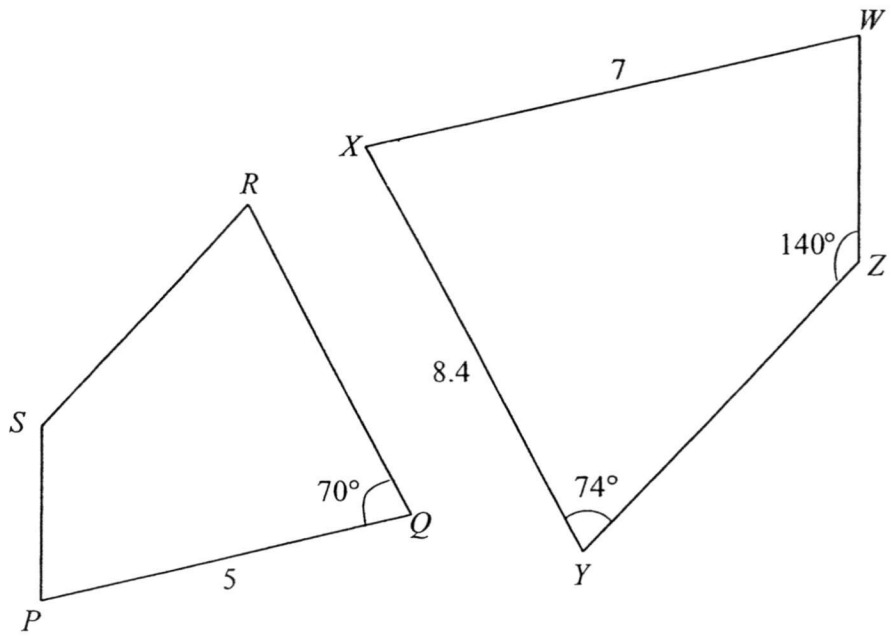
For Examiner use

trendyline

Downloaded from SingaKids.com

For Examiner's use

8 In the diagram, $PQRS$ is similar to $WXYZ$ with $PQ = 5$ cm, $WX = 7$ cm, $XY = 8.4$ cm and $\angle PQR = 70°$, $\angle XYZ = 74°$ and $\angle YZW = 140°$.



Find

(a) $\angle ZWX$,

(b) QR.

Answer *(a)* ..... **[1]**

(b) ..... **[2]**

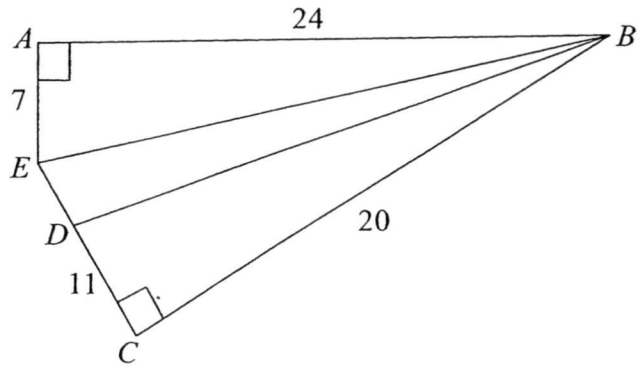
trendyline

Downloaded from SingaKids.com

For Examiner's use

For Examiner use

9 In the diagram below, ABE is a right-angled triangle with $AB = 24$ cm and $AE = 7$ cm. CBE is a right-angled triangle with a point D on EC such that $DC = 11$ cm and $BC = 20$ cm.



(a) By finding the length of BE first, show that the length of $DE = 4$ cm **[2]**

(b) Write down the value of

(i) $\cos \angle ABE$, **(ii)** $\sin \angle BEC$, **(iii)** $\tan \angle DBC$.

(c) Find the shortest distance of C to BE.

Answer *(b)* *(i)* ..... **[1]**

(ii) ..... **[1]**

(iii) ..... **[1]**

(c) .....cm **[2]**

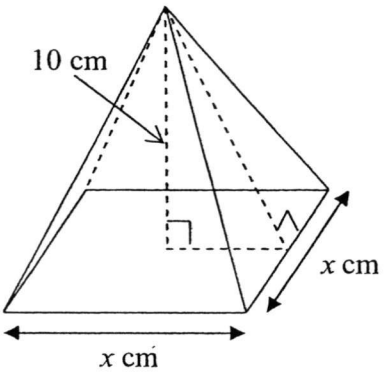
[TURN OVER

trendyline

Downloaded from SingaKids.com

For Examiner's use

10 The diagram below shows a right square pyramid with height 10 cm.



If it has a volume of 480 cm^3, find

(a) the value of x,

(b) its total surface area.

Answer *(a)* $x =$ ..... **[2]**

(b) .....cm^2 **[3]**

110

For Examiner s use

trendyline

Downloaded from SingaKids.com

For Examiner's use

11 The table shows the record of scores by 19 students in a Mathematics test.

54	81	36	51	65	71	70	58	62	68
32	60	43	35	59	64	36	60	62	

The full score is 100 marks.

Mrs Lee tabulated the scores in the ordered stem-and-leaf diagram below.

Stem	Leaf
3	2 6 6 6
4	3
5	1 4 8 9
6	0 0 2 2 4 5 8
7	0 1
8	1

Key: 3 | 2 represents 32 marks

(a) Write down the modal score of the 19 students.

(b) Calculate the median score of the 19 students.

(c) The top 6 students were selected to participate in a mathematics competition. What is the minimum mark a student needs to obtain to participate in the competition?

(d) The passing mark for the test is 50. The scores of another 6 students were added to the record and the number of students who passed increase to 76%. How many new students passed the test?

Answer *(a)* ..... **[1]**

(b) ..... **[1]**

(c) ..... **[1]**

(d) ..... **[1]**

For Examiner s use

trendyline

Downloaded from SingaKids.com

For Examiner's use

12 The time taken by 70 Secondary Two Express students to complete their mathematics homework is given in the table below.

Time in minutes (min)	Number of Students (f)	Mid-value (x)	fx
$28 < x \leq 36$	17		
$36 < x \leq 44$	24	40	960
$44 < x \leq 52$	16		
$52 < x \leq 60$	13		
Total	70	**Total**	

(a) Complete the table above and hence calculate an estimate of the mean time taken.

(b) If a student is chosen from the group, what is the probability that he/she completes homework within 44 minutes?

Answer *(a)* ..... **[3]**

(b) ..... **[1]**

For Examiner's use

trendyline

Downloaded from SingaKids.com

For Examiner's use

13 The mean of 5 numbers is $34\frac{3}{5}$.

(a) Find the sum of the 5 numbers.

3 of the numbers are 36.75, 87 and 9.25.

The remaining 2 numbers are in the ratio of $3:5$.

(b) Find the smaller of the remaining 2 numbers.

Answer *(a)* ..... **[1]**

(b) ..... **[2]**

For Examiner use

trendyline

Downloaded from SingaKids.com

For Examiner's use

14 Consider the number pattern,

Line 1 : $11 - 2 = 3^2$

Line 2 : $1111 - 22 = 33^2$

Line 3 : $111111 - 222 = 333^2$

....

$x - y = 333\,333\,333\,333^2$

(a) Write down Line 4 for the pattern above.

(b) Find the number of '1' in x.

Answer (a) ..... **[1]**

(b) ..... **[1]**

End-of-Paper 1

112

For Examiner use

trendyline

Downloaded from SingaKids.com

Bukit Merah Secondary School
End of Year Examination 2015
Secondary 2 Express
(Mathematics Paper 1) – Marking Scheme

1	a	63.30	B1	
	b	0.1820	B1	
2	a	90720	B1	
	b	294	B1	
3		$\frac{3(2x+5)}{4} = \frac{13}{8}x$ $6(2x+5) = 13x$ $12x + 30 = 13x$ $x = 30$	M1 A1	
4	a	$50a^2 - (49a^2 - 56ab + 16b^2)$ $= a^2 + 56ab - 16b^2$	M1 A1	
	b(i)	$(8c+5d)(8c-5d)$	B1	
	b(ii)	$32pr - 28qr + 21sq - 24sp$ $= 4r(8p-7q) + 3s(7q-8p)$ $= 4r(8p-7q) - 3s(8p-7q)$ $= (8p-7q)(4r-3s)$	M1 A1	
5	a	1 : 250000	B1	
	b	1.12 cm	B1	
	c	$1cm^2 : 6.25km^2$ $13.4cm^2 : 83.75km^2$	M1 A1	
6	a	$6x(x+3) = 0$ $x = 0 or -3$	M1 A1 for both	
	b	$(2x-7)(2x-5) = 0$ $x = 3.5 or 2.5$	M1 A1 for both	
7		$43y = 129$ $y = 3$ $x = -6$	M1 A1 A1	
8	a	76	B1	
	b	$\frac{QR}{8.4} = \frac{5}{7}$ $QR = 6$	M1 aef A1	
9	a	BE = 25 DE = 4	M1 A1	
	b(i)	$\frac{24}{25}$	B1	
	(ii)	$\frac{4}{5}$	B1	

113

trendyline

Downloaded from SingaKids.com

	(iii)	$\frac{11}{20}$	B1	
	c	$\frac{1}{2}\times 15\times 20 = 150$ $h = 12$	M1 A1	
10	a	$\frac{1}{3}x^2(10) = 480$ $x^2 = 144$ $x = 12$	M1 A1	
	b	$12\times 12 = 144$ $4(\frac{1}{2}\times 12\times\sqrt{136})$ 424	M1 M1 A1	
11	a	36	B1	
	b	60	B1	
	c	64	B1	
	d	5	B1	
12	a	32, 544 48, 768 56, 728	M1 ecf	
		Mean score = $\frac{544+960+768+728}{70}$ $= 42\frac{6}{7}$	M1 ecf A1	
	b	$\frac{41}{70}$		
13	a	173		
	b	$40\div 8 = 5$ $5\times 3 = 15$	M1 A1	
14	a	$11111111-2222=3333^2$	B1	
	b	24	B1	

trendyline

Downloaded from SingaKids.com

Class	Register No	Name

Bukit Merah Secondary School
End-of-Year Examination 2015
Secondary 2 Express

E

MATHEMATICS

8 Oct 2015

Paper 2

1 hour 30 minutes

Candidates answer on foolscap and graph papers

READ THESE INSTRUCTIONS FIRST

Write your class, register number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, 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.
Calculators should be used when 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.

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 **60**.

Calculator Model:

For Examiner's Use

This document consists of 7 printed pages.

114

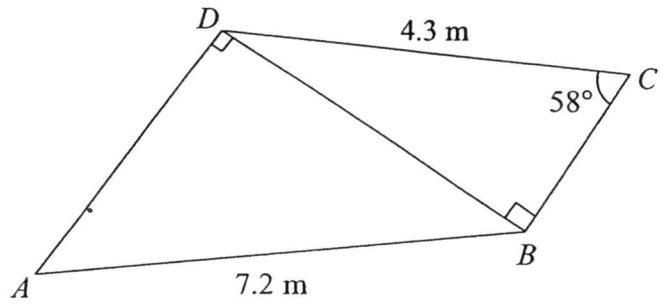
[TURN OVER

trendyline

Downloaded from SingaKids.com

Answer **all** the questions

1 In the figure below, $CD = 4.3$ m, $AB = 7.2$ m and $\angle BCD = 58°$.



Find

(a) BD, **[2]**

(b) $\angle ABD$. **[2]**

---

2 **(a)** Simplify each of the following algebraic fractions.

(i) $\dfrac{35b^2}{2y} \times \dfrac{y^2}{7ab^3}$ **[1]**

(ii) $\dfrac{6}{8x^2 - 6xy} \div \dfrac{9}{3y - 4x}$ **[2]**

(b) Express $\dfrac{5}{x^2 + 3x - 4} - \dfrac{2}{x - 1}$ as a single fraction in its simplest form. **[3]**

---

3 **(a)** Given that y is inversely proportional to the cube root of x, and that $x = 64$ when $y = 12.75$.

(i) Find the equation connecting x and y. **[2]**

(ii) Find the value of x when $y = 3$. **[1]**

(iii) Find the change in the value of y when the value of x is divided by 125. **[2]**

(b) A formula is given as $\sqrt{\dfrac{x - 2p}{9w + 5x}} = y$. **[3]**

Make x the subject of the formula.

trendyline

Downloaded from SingaKids.com

4 Mrs Lee bought some crabs and fish.

(a) She bought x kg of crabs for \$140. **[1]**
Write down an expression, in terms of x for the cost of 1 kg of crabs.

(b) She bought some fish with \$140. She received 3 kg more fish than crabs. **[1]**
Write down an expression, in terms of x for the cost of 1 kg of fish.

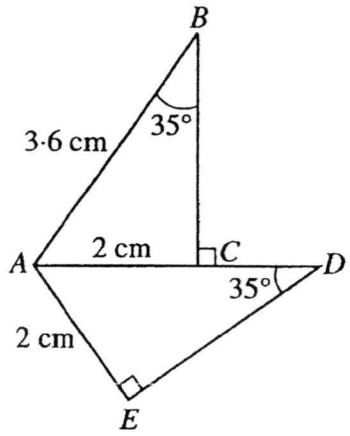
(c) The cost of 1 kg of fish is \$15 less than the cost of 1 kg of crab. **[3]**
Write down an equation in terms of x and show that it reduces to $3x^2 + 9x - 84 = 0$.

(d) Solve the equation $3x^2 + 9x - 84 = 0$. **[2]**

(e) How many kilograms of fish and crabs did she buy? **[1]**

---

5 The two triangles shown below are congruent to each other.



(a) Name the triangle that is congruent to ΔABC. **[1]**

(b) Find $\angle BAC$. **[1]**

(c) Find the length of CD. **[1]**

15

trendyline
Downloaded from SingaKids.com

6 **(a)** A card is drawn at random from a pack of 25 cards, numbered 1 to 25.
Find the probability that the number on the card is,

(i) a multiple of 6, **[1]**

(ii) not more than 13, **[1]**

(iii) a prime number. **[1]**

(b) Jim is equally interested in buying rabbits named A, B, C, D and E.
He bought **two** of them at random because of the budget.

(i) List down the sample space of his possible purchases. **[2]**

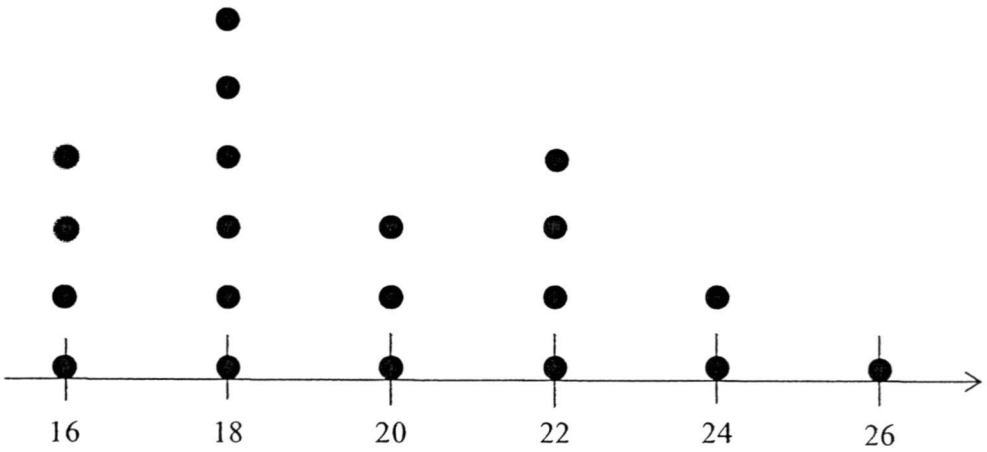
(ii) Find the probability that rabbit C is bought. **[1]**

(iii) Find the probability that rabbit B is bought but rabbit D is not bought. **[1]**

trendyline

Downloaded from SingaKids.com

7 **(a)** The time in minutes taken by 20 patrons at a food court *A* to finish their meal is represented by the dot diagram below.



Time taken in minutes

(i) Find the mean, median and mode of the data. **[3]**

(ii) The management of the food court *A* says that the average time taken by a patron to finish a meal is 22 minutes. Does your data prove or disprove this statement? Explain briefly. **[1]**

(b) The time in minutes taken by another 20 patrons at a food court *B* to finish their meal is represented by the frequency table below.

Time (minutes)	16	18	20	22	24	26	28
Number of patrons	1	3	4	2	7	2	1

This distribution is to be shown in a pie chart.

(i) Calculate the angle representing the patrons who spent more than 24 minutes. **[1]**

(ii) Calculate the median time taken by the patron in food court *B*. **[1]**

(iii) State, with a reason, which food court has their patrons leaving earlier after their meal. **[1]**

116

trendyline

Downloaded from SingaKids.com

8 **Diagram I** below shows a solid balancing toy made up of a hemisphere attached to the bottom of the cylinder. The radius of the hemisphere is 2 cm and the height of the cylinder is 8 cm.

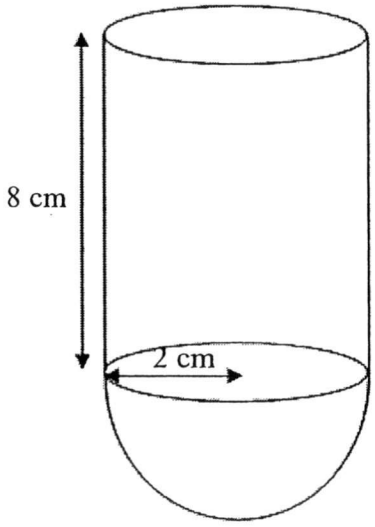


Diagram I

(a) Find the volume of the toy. **[3]**

(b) To lighten its weight, a cone with radius 1 cm and height 7.6 cm is sawed away from the toy as shown in **Diagram II** below.

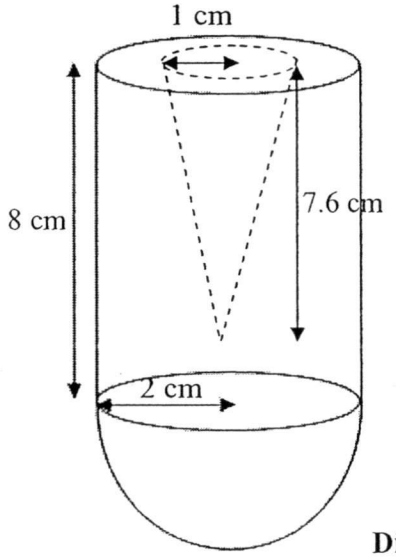


Diagram II

(i) Find the total surface area of the newly created toy in **Diagram II**. **[4]**

(ii) Given that the newly created toy (in **Diagram II**) is melted to form a cube, what is the largest possible integer length of the cube? **[3]**

$$\left(\text{Volume of Cone} = \frac{1}{3}\pi r^2 h \ ; \text{Volume of Sphere} = \frac{4}{3}\pi r^3, \right.$$
$$\left. \text{Curved Surface Area of Cone} = \pi r l \ ; \ \text{Surface Area of Sphere} = 4\pi r^2 \right)$$

trendyline

Downloaded from SingaKids.com

9 **Answer the whole of this question on a sheet of graph paper.**

The variables x and y are connected by the equation $y = 2x^2 - 6x + 11$.
The table of values is as shown below.

x	-2	-1	0	1	2	3
y	31	p	11	7	7	q

(a) Find the values of p and q. **[1]**

(b) Using 2 cm to represent 1 unit along the horizontal x-axis and 2 cm to represent 5 units along the vertical y-axis, draw the graph of $y = 2x^2 - 6x + 11$ for $-2 \leq x \leq 3$. **[3]**

(c) From your graph,

(i) find the value of y when $x = -0.5$ **[1]**

(ii) write the coordinates of the minimum point. **[1]**

(iii) write the equation of the line of symmetry. **[1]**

End-of-Paper 2

117

trendyline

Downloaded from SingaKids.com

Bukit Merah Secondary School
End of Year Examination 2015
Secondary 2 Express
(Mathematics Paper 2) – Marking Scheme

1	a	$\sin 58° = \dfrac{BD}{4.3}$ $BD = 3.646606813$ $BD = 3.65$ $\cos \angle ABD = \dfrac{3.646606813}{7.2}$ $\angle ABD = 59.57080651°$ $= 59.6°$	M1 A1 M1 ECF A1	
2	a(i)	$\dfrac{5y}{2ab}$	B1	
	(ii)	$\dfrac{6}{2x(4x-3y)} \div \dfrac{9}{3y-4x}$ $= \dfrac{6}{2x(4x-3y)} \times \dfrac{-(4x-3y)}{9}$ $= -\dfrac{1}{3x}$	M1 A1	
	b	$\dfrac{5}{x^2+3x-4} - \dfrac{2}{x-1}$ $= \dfrac{5}{(x+4)(x-1)} - \dfrac{2}{x-1}$ $= \dfrac{5-2(x+4)}{(x+4)(x-1)}$ $= \dfrac{-2x-3}{(x+4)(x-1)}$	 M1 M1 A1	
3	a(i)	$y = \dfrac{k}{\sqrt[3]{x}}$ $12.75 = \dfrac{k}{\sqrt[3]{64}}$ $k = 51$ $y = \dfrac{51}{\sqrt[3]{x}}$	 M1 A1	
	(ii)	$3\sqrt[3]{x} = 51$ $3\sqrt[3]{x} = 17$ $x = 4913$	 B1 follow through	

118

trendyline

Downloaded from SingaKids.com

	(iii)	$newy = \dfrac{51}{\sqrt[3]{\dfrac{x}{125}}}$ $= 5(\dfrac{51}{\sqrt[3]{x}})$ New y is 5 times of old y.	M1 ECF A1	
	b	$y^2 = \dfrac{x-2p}{9w+5x}$ $y^2(9w+5x) = x-2p$ $9y^2w+5xy^2 = x-2p$ $9y^2w+2p = x-5xy^2$ $x(1-5y^2) = 9y^2w+2p$ $x = \dfrac{9y^2w+2p}{1-5y^2}$	M1 M1 for take out factor A1	
4	a	$\$\dfrac{140}{x}$	B1	
	b	$\$\dfrac{140}{x+3}$	B1	
	c	$\dfrac{140}{x+3}+15 = \dfrac{140}{x}$ $140x+15x^2+45x = 140x+420$ $15x^2+45x-420 = 0$ $3x^2+9x-84 = 0$	M1 M1 A1	
	d	$(3x-12)(x+7) = 0$ $x = 4 or -7$	M1 A1 for both	
	e	4 kg of crabs and 7 kg of fish	B1	
5	a	ΔADE	B1	
	b	55° or 56.3 (error)	B1	
	c	1.6 cm or 1.49 (error)	B1	
6	a(i)	$\dfrac{4}{25}$	B1	
	(ii)	$\dfrac{13}{25}$	B1	
	(iii)	$\dfrac{9}{25}$	B1	
	b(i)	$\{AB, AC, AD, AE, BC, BD, BE, CD, CE, ED\}$	B1 for first 5 B1 for next 5	
	(ii)	$\dfrac{2}{5}$	B1	
	(iii)	$\dfrac{3}{10}$	B1	
7	a(i)	Mean is 19.7, median is 19, mode is 18	B1 B1 B1	

trendyline

Downloaded from SingaKids.com

	(ii)	Disprove, all the averages are not 22.	B1 with reason	
	b(i)	54°	B1	
	(ii)	23 min	B1	
	(iii)	Food court A, because median time is lower	B1 with reason	
8	a	$volume = (\pi \times 2^2 \times 8) + (\frac{2}{3} \times \pi \times 2^3)$ $= 117.2861257$ $= 117 cm^3$	M1 M1 A1	
	b(i)	$curvedSA = (2\pi \times 2^2) + (2\pi \times 2 \times 8)$ $= 125.6637061$ $topbasearea = \pi(2^2) - \pi(1)^2$ $= 9.424777961$ $slantedheight = \sqrt{1^2 + 7.6^2}$ $= \sqrt{58.76}$ $\pi \times 1 \times \sqrt{58.76}$ $= 24.08190098$ $totalSA = 125.6637061 + 9.424777961 + 24.08190098$ $= 159.170385$ $= 159$	M1 M1 M1 ECF A1	
	(ii)	$117.2861257 - (\frac{1}{3} \times \pi \times 1^2 \times 7.6)$ $= 109.3274243$ $\sqrt[3]{109.3274243}$ $= 4.781634454$ $l \arg estpossiblelength = 4cm$	M1 ECF M1 ECF B1 based on answer	
9	a	$p = 19, q = 11$	B1 for both	
	b	Plotting Scaling Curve (smooth)	P1 S1 C1	
	c(i)	14.5 (plus minus 0.5)	B1	
	(ii)	(1.5, 6.5) x coordinate plus minus 0.1 , y coordinate plus minus 0.5	B1	
	(iii)	x = 1.5 plus minus 0.1	B1	

trendyline

Downloaded from SingaKids.com

Downloaded from SingaKids.com