| Class | Register No | Name |
|---|---|---|
| | | |

# Bukit Merah Secondary School
# Mid-Year Examination 2015
# Secondary 2 Express

**E**

## MATHEMATICS

**Paper 1** **11 May 2015**

Candidates answer on the Question Paper. **1 hour 15 minutes**

**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 $\pi$, 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 |
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| |

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Answer **all** the questions

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**1** Written as a product of its prime factors, $15750 = 2 \times 3^2 \times 5^3 \times 7$.

*For Examiner use*

**(a)** Express 1800 as the product of its prime factors.

**(b)** Hence write down

**(i)** the Lowest Common Multiple of both 1800 and 15750,

**(ii)** the Highest Common Factor of both 1800 and 15750.

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

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

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



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

**(a)** $\dfrac{14.32^2 - \sqrt{25.781}}{\sqrt[3]{981}}$ [2 decimal places]

**(b)** $\left(-\dfrac{2}{7}\right)^3 + \sqrt{7 - 1\dfrac{4}{9}} + \left(9.4 \times \dfrac{11}{13}\right)$ [3 significant figures]

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

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

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3 Alvin's present age is 5 years less than $\dfrac{1}{2}$ times the present age of Bobby.

If Bobby is $x$ years old now, express, in terms of $x$, Alvin's present age.

*Answer* .....*years old* **[1]**



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*For Examiner's use*

**4** Suppose that 4 cm on a map represents an actual distance of 6 km.

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

**(b)** If the distance between two towns on the map is 9.2 cm, find their actual distance apart in km.

**(c)** The actual area of a town is 15.3 $km^2$. Find its area on the map.

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

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

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

*For Examiner use*



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5 It is given that $y$ is directly proportional to $(2x-1)$. When $x = 10$, $y = 15.2$.

**(i)** Find the equation connecting $x$ and $y$.

**(ii)** Find the value of $y$ when $x = 26$.

For Examiner s use

*(i)* ..... **[2]**

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



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*For Examiner's use*

**6** **(a)** Expand and simplify the following expressions.

**(i)** $-5(2x^2-1)+2x(-3-x)$

**(ii)** $(4y-7)^2+6y$

**(b)** Factorise the following expressions completely.

**(i)** $5q^2-23q+12$

**(ii)** $a^3-25ab^2$

*For Examiner s use*

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

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

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

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



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7 **(a)** Simplify each of the following.

**(i)** $\dfrac{4c^2 - d^2}{(d - 2c)}$

**(ii)** $\dfrac{2a}{3bc} \div \dfrac{4ba^2}{abc^2}$

**(b)** Express $\dfrac{5}{6pq} + \dfrac{3}{4p^2}$ as a single fraction in its simplest form.

For Examiner s use

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

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

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



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*For Examiner's use*

**8** Solve each of the following equations.

**(a)** $(x+3)(3x-8)=0$

**(b)** $5x^2-8x=0$

**(c)** $4x^2-19x+12=0$

*For Examiner use*

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

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

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



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For Examiner's use

9 Given the equation of the line $3x + 4y = 10$,

**(a)** **(i)** find the gradient of the line.

**(ii)** find the $y$-intercept of the line.

**(b)** Is $(8,-3.5)$ a solution of the equation $3x + 4y = 10$?
Show your working clearly. **[1]**

For Examiner use

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

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



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*For Examiner's use*

**10** Solve the simultaneous linear equations,

$$8x - 3y = 10$$
$$3x - 4y = 21$$

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

*For Examiner use*

**11** The scale drawing of a car is 4 cm to 0.8 m.
The length of the car on the drawing is 21 cm.

**(a)** Find the actual length of the car.

**(b)** If the scale of the drawing is changed to $\frac{1}{30}$, find the length of the car on the new drawing.

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

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

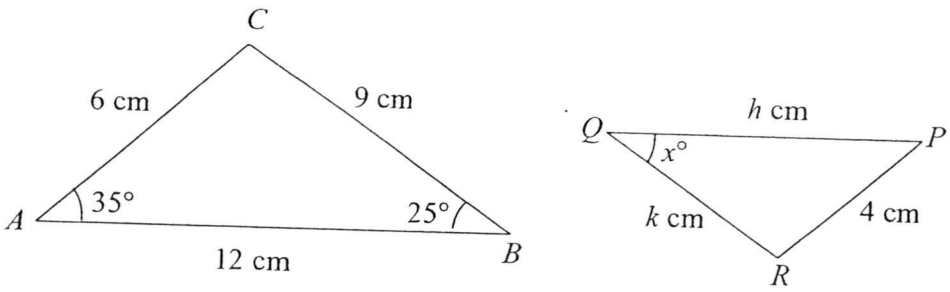


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**12** In the figure below, $\Delta ABC$ is similar to $\Delta PQR$.




**(a)** Given that $\Delta PQR$ is a reduction of $\Delta ABC$, find the scale factor of the reduction.

**(b)** Find the unknowns $x$, $h$ and $k$.

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

*(b)* $x$ = .....

$h$ = .....

$k$ = ..... **[3]**



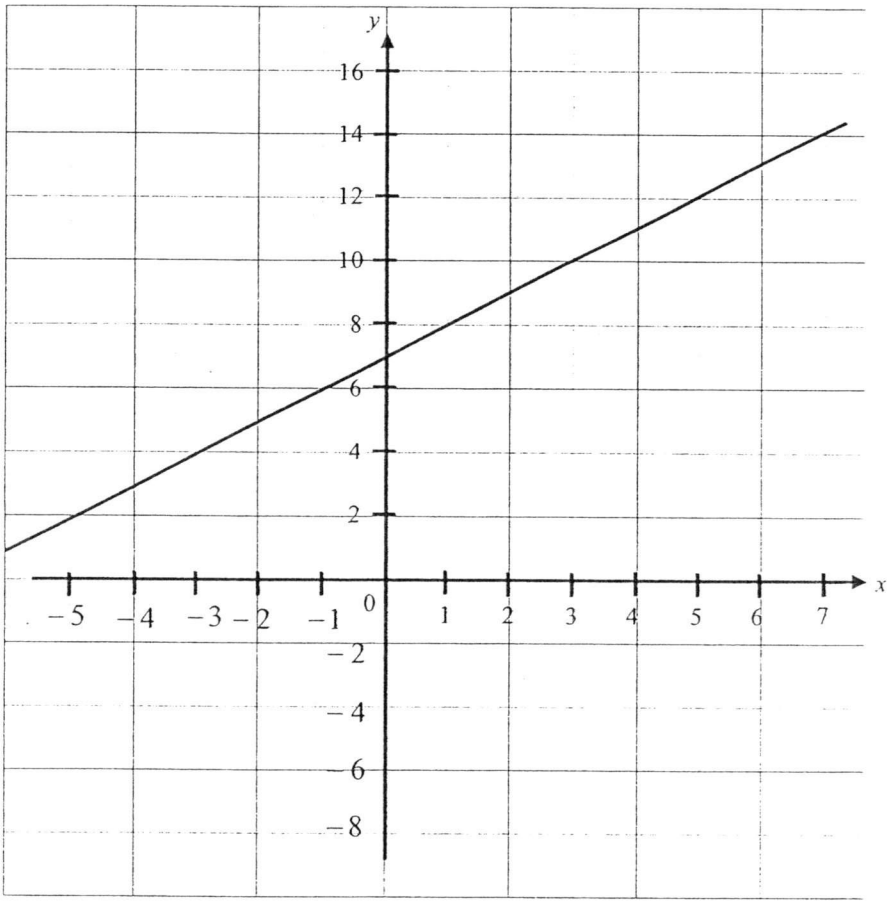
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**13** The graph of the straight line $y = x + 7$ is shown in the grid below.

For Examiner s use




**(a)** Complete the table of values for the equation $y = -2x + 10$. **[1]**

| $x$ | $-2$ | | 4 |
|---|---|---|---|
| $y$ | 14 | 6 | 2 |

**(b)** Draw and label the graph of the straight line $y = -2x + 10$ on the same grid above. **[2]**

**(c)** Hence, write down the point of intersection of these two straight line graphs.

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

**End-of-Paper 1**

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

| | | | | |
|---|---|---|---|---|
| 1 | a | $2^3 \times 3^2 \times 5^2$ | B1 | |
| | b(i) | LCM = $2^3 \times 3^2 \times 5^3 \times 7$<br>= 63 000 | B1 | |
| | b(ii) | HCF = $2 \times 3^2 \times 5^2$<br>= 450 | B1 | |
| | | | | |
| 2 | a | 20.13 (2 d.p) | B1 | |
| | b | 10.3 (3 s.f) | B1 | |
| | | | | |
| 3 | | $\left(\frac{1}{2}x - 5\right)$ | B1 | |
| | | | | |
| 4 | a | 1 : 150000 | B1 | |
| | b | 13.8 km | B1 | |
| | c | $1cm^2 : 2.25km^2$<br>$15.3 \div 2.25 = 6.8cm^2$ | M1<br>A1 | |
| | | | | |
| 5 | (i) | $15.2 = k(19)$<br>$k = 0.8$<br>$y = 0.8(2x - 1)$ | M1<br>A1 | |
| | (ii) | 40.8 | B1 | |
| | | | | |
| 6 | a(i) | $-10x^2 + 5 - 6x - 2x^2$<br>$= -12x^2 - 6x + 5$ | M1<br>A1 | |
| | a(ii) | $(4y)^2 - 2(4y)(7) + (7)^2 + 6y$<br>$= 16y^2 - 56y + 49 + 6y$<br>$= 16y^2 - 50y + 49$ | M1<br><br><br>A1 | |
| | b(i) | Factorisation working<br>$(5q - 3)(q - 4)$ | M1<br>A1 | |
| | b(ii) | $a(a^2 - 25b^2)$<br>$= a(a + 5b)(a - 5b)$ | M1<br><br>A1 | |
| | | | | |
| 7 | a(i) | $\frac{(2c + d)(2c - d)}{d - 2c}$<br>$= \frac{(2c + d)(-(d - 2c))}{(d - 2c)}$<br>$= -(2c + d)$ | M1 for factorisation<br><br><br>A1 | |

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| | | | | |
|---|---|---|---|---|
| | a(ii) | $\frac{2a}{3bc} \times \frac{abc}{4ba^2}$<br>$= \frac{c}{6b}$ | B1 for 'c'<br>B1 for '6b' | |
| | | | | |
| | b | $\frac{5(2p)}{12p^2q} + \frac{3(3q)}{12p^2q}$<br>$= \frac{10p+9q}{12p^2q}$ | M1<br>A1 | |
| | | | | |
| 8 | a | $x = -3$ or $x = 2\frac{2}{3}$ | B1 for both | |
| | b | $x(5x-8) = 0$<br>$x = 0$ *or* $x = 1.6$ | M1<br>A1 for both | |
| | c | $(4x-3)(x-4) = 0$<br>$x = \frac{3}{4}$ or $x = 4$ | M1<br>A1 for both | |
| | | | | |
| 9 | a(i) | $-0.75$ | B1 | |
| | a(ii) | 2.5 | B1 | |
| | b | $y = -\frac{3}{4}(8) + \frac{10}{4}$<br>$= -3.5$ | B1 must show substitution step | |
| | | | | |
| 10 | | $23x = -23$<br>$x = -1$<br>$8(-1) - 3y = 10$<br>$-3y = 18$<br>$y = -6$ | M1 for correct elimination or substitution<br>A1 A1 | |
| | | | | |
| 11 | a | $21 \times 0.2$<br>$= 4.2m$ | M1<br>A1 | |
| | b | $4.2m \div 0.3$<br>$= 14cm$ | M1<br>A1 | |
| | | | | |
| 12 | a | $\frac{2}{3}$ | B1 | |
| | b | $k = 6$cm<br>$h = 8$<br>$x = 25$ | B1<br>B1<br>B1 | |
| | | | | |

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| | | | | |
|---|---|---|---|---|
| 13 | a | $x = 2$ | B1 | |
| | b | Draw a straight line with pencil, Line passes through all the points<br>Label the line | B1<br><br>B1 | |
| | c | (1, 8) | B1 | |



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# Bukit Merah Secondary School
# Mid-Year Examination 2015
# Secondary 2 Express

**E**

## MATHEMATICS

**Paper 2**

**14 May 2015**

**1 hour 30 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 $\pi$, 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:**

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Answer **all** the questions

1 **(a)** A region of area 3 $cm^2$ on the map is represented by its actual area of 48 $km^2$. Find the scale of the map in the form $\frac{1}{r}$. **[3]**

**(b)** The following table shows some corresponding values of two quantities, $c$ and $d$.

| $c$ | 2 | 4 | 8 |
|---|---|---|---|
| $d$ | 20 | 5 | 1.25 |

**(i)** Is $d$ inversely proportional to $c^2$ ? Show all working clearly. **[1]**

**(ii)** Hence, find the equation connecting $d$ and $c$. **[1]**

**(iii)** Find the value of $d$ when $c = -\frac{1}{2}$. **[1]**

**(iv)** Find the change in the value of $d$ when the value of $c$ is multiplied by 4. **[2]**

---

2 A list of numbers is shown below.

$$\sqrt{12.25}, \quad -1\frac{5}{12}, \quad \sqrt[3]{125}, \quad 3.\dot{5}, \quad -1.42, \quad \sqrt{5}$$

**(a)** From the list, write down the

**(i)** prime number (s), **[1]**

**(ii)** irrational numbers (s). **[1]**

**(b)** Write down the numbers in ascending order. **[2]**

---

3 **(a)** Expand and simplify $(x-6y)(2x+y)$. **[2]**

**(b)** Factorise the following expressions completely.

**(i)** $24p^2 - 8pq$ **[1]**

**(ii)** $2x^3 - 72x$ **[2]**

**(iii)** $20ac - 12bc - 15bd + 25ad$ **[2]**

**(c)** Given that $x^2 + y^2 = 19$ and $xy = -6$, find the value of $(x-y)^2$. **[2]**



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4 **(a)** Simplify $\frac{x^2+3x-10}{2x^2-4x} \times \frac{3x}{(x+5)^2}$ [3]

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

**(c)** A formula is given as $p = \frac{-2x+5r}{7-3x}$.

**(i)** Find the value of $p$ when $x = 4$ and $r = -10$, [1]

**(ii)** Make $x$ the subject of the formula. [3]

---

5 **(a)** Solve the equation, $(5x+2)(x-1) = 14x+10$ [3]

**(b)** There are two consecutive positive even integers.
Twice the square of the smaller number is greater than the square of the larger number by 188.

**(i)** By letting the smaller integer be $x$, form an equation in $x$ and show that it reduces to $x^2 - 4x - 192 = 0$ [2]

**(ii)** Hence, solve for $x$ and find the larger number. [2]

---

6 Jane has 102 coins, in 20-cent and 50-cent coin denominations.
Let the number of 20-cent coins and 50-cent coins be $x$ and $y$ respectively.

**(a)** Form an equation connecting $x$ and $y$. [1]

The total value of the coins is \$34.20.

**(b)** Form another equation connecting $x$ and $y$. [1]

**(c)** Hence, find the number of 20-cent and 50-cent coins. [3]

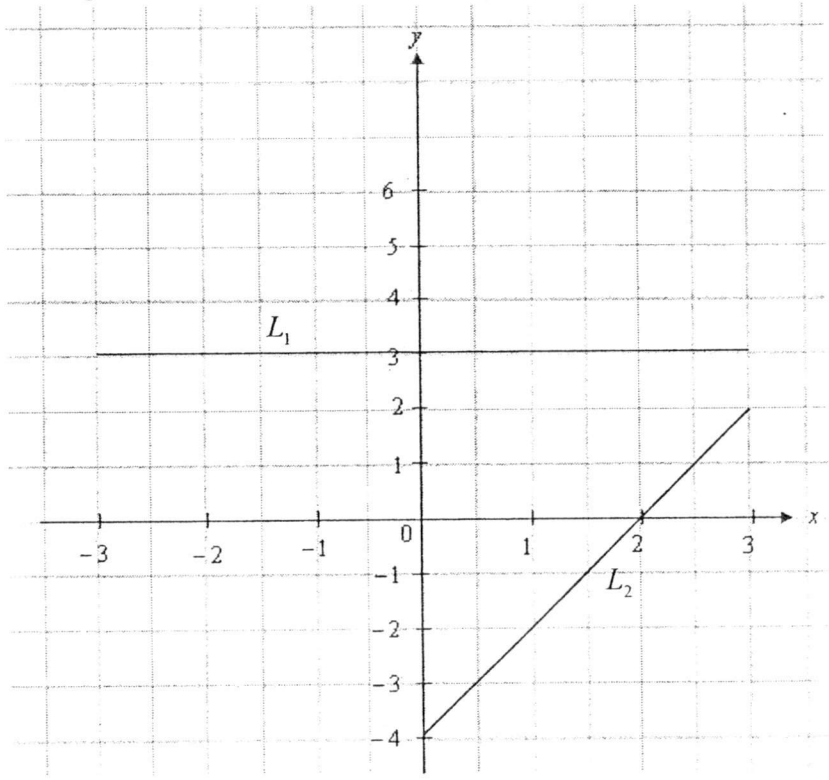
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7 The diagram shows the graph of lines $L_1$ and $L_2$.



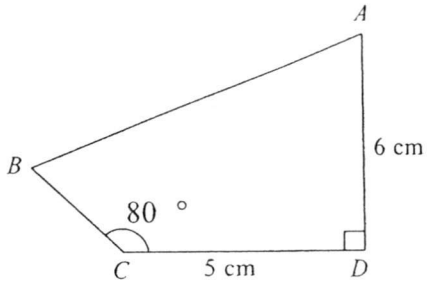

Find the gradient of line

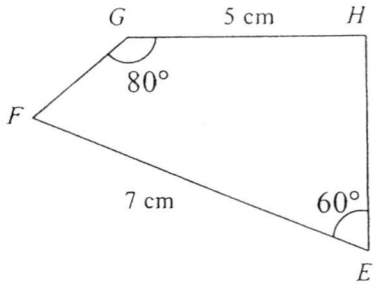
**(a)** $L_1$, **[1]**

**(b)** $L_2$. **[2]**

---

8 In the diagram, $ABCD \equiv EFGH$.
The perimeter of $ABCD$ is 21 cm.




**(i)** Find the length of $AB$. **[1]**

**(ii)** Find the length of $FG$. **[1]**

**(iii)** Find $\angle GHE$. **[1]**



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9 If Amy buys 9 mangoes, she will have \$4 left in her pocket.
If she buys 6 mangoes, she will have \$9.40 left in her pocket.
Find the amount of money in her pocket. [2]

---

10 **Answer the whole of this question on a sheet of graph paper.**
The variables $x$ and $y$ are connected by the equation $y = -x^2 + x + 6$.
The table of values is as shown below.

| $x$ | $-2$ | $-1$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| $y$ | 0 | $p$ | 6 | 6 | 4 | $q$ |

**(a)** Find the values of $p$ and $q$. [2]

**(b)** Using 2 cm to represent 1 unit along the horizontal $x$-axis and vertical $y$-axis, draw the graph of $y = -x^2 + x + 6$ for $-2 \leq x \leq 3$. [4]

**(c)** From your graph,

**(i)** find the value of $y$ when $x = 2.5$, [1]

**(ii)** find the values of $x$ when $y = 1$. [1]

**(iii)** write the coordinates of the maximum point. [1]

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

**End-of-Paper 2**



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**Bukit Merah Secondary School**
**Mid-Year Examination 2015**
**Secondary 2 Express**
**(Mathematics Paper 2) – Marking Scheme**

| | | | | |
|---|---|---|---|---|
| 1 | a | $1cm : 4km$<br>$1cm : 400000cm$<br>Scale is $\frac{1}{400000}$ | M1<br>M1<br>A1 | |
| | b(i) | Show there is a constant 80 for $dc^2$ in all cases. | B1 | |
| | b(ii) | $dc^2 = 80$ | B1 | |
| | b(iii) | 320 | B1 | |
| | b(iv) | $use\ c = 2$<br>$new\ c = 8$<br>$new\ d = \frac{80}{8^2}$<br>$= 1.25$<br>$change\ is = \frac{1.25}{20}$<br>$= \frac{1}{16}\ times$ | M1 when found new d<br>A1 | |
| | | | | |
| 2 | a(i) | $\sqrt[3]{125}$ | B1 | |
| | a(ii) | $\sqrt{5}$ | B1 | |
| | b | $-1.42, -1\frac{5}{12}, \sqrt{5}, \sqrt{12.25}, 3.\dot{5}, \sqrt[3]{125}$ | B1 for any 3 in order<br>B1 for the remaining 3 in order | |
| | | | | |
| 3 | a | $(x-6y)(2x+y)$<br>$= x(2x+y) - 6y(2x+y)$<br>$= 2x^2 + xy - 12xy - 6y^2$<br>$= 2x^2 - 11xy - 6y^2$ | M1<br>A1 | |
| | b(i) | $8p(3p-q)$ | B1 | |
| | b(ii) | $2x(x^2 - 36)$<br>$= 2x(x+6)(x-6)$ | M1<br>A1 | |
| | b(iii) | $4c(5a-3b) - 5d(3b-5a)$<br>$= 4c(5a-3b) + 5d(-3b+5a)$<br>$= (5a-3b)(4c+5d)$ | M1<br>A1 | |

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| | | | | |
|---|---|---|---|---|
| | c | $(x-y)^2 = x^2 - 2xy + y^2$<br>$= x^2 + y^2 - 2xy$<br>$= 19 - 2(-6)$<br>$= 31$ | M1<br><br><br><br>A1 | |
| 4 | a | $\frac{(x+5)(x-2)}{2x(x-2)} \times \frac{3x}{(x+5)^2}$<br>$= \frac{3}{2(x+5)}$ | M1 for $(x+5)(x-2)$, M1 for $2x(x-2)$<br>A1 | |
| | b | $\frac{3(x-4)}{(2x-5)(x-4)} - \frac{4(2x-5)}{(2x-5)(x-4)}$<br>$= \frac{3x-12-8x+20}{(2x-5)(x-4)}$<br>$= \frac{8-5x}{(2x-5)(x-4)}$ | M1<br><br><br><br>A1 | |
| | c(i) | 11.6 | B1 | |
| | c(ii) | $p(7-3x) = -2x + 5r$<br>$7p - 3px = -2x + 5r$<br>$2x - 3px = 5r - 7p$<br>$x = \frac{5r-7p}{2-3p}$ | M1 after expansion<br>M1 with all terms with $x$ on one side<br>A1 | |
| 5 | a | $(5x+2)(x-1) = 14x + 10$<br>$5x^2 - 5x + 2x - 2 = 14x + 10$<br>$5x^2 - 3x - 2 - 14x - 10 = 0$<br>$5x^2 - 17x - 12 = 0$<br>$(5x+3)(x-4) = 0$<br>$x = -0.6$ *or* $4$ | <br><br><br>M1<br>M1<br><br>A1 | |
| | b(i) | $2(x)^2 = (x+2)^2 + 188$<br>$2x^2 = x^2 + 2(x)(2) + 2^2 + 188$<br>$x^2 - 4x - 192 = 0$ | M1<br><br><br>A1 | |
| | b(ii) | $(x-16)(x+12) = 0$<br>$x = 16$ or $-12$<br>larger number is $16 + 2 = 18$ | <br>M1<br><br>A1 | |
| 6 | a | $x + y = 102$ | B1 | |
| | b | $20x + 50y = 3420$ | B1 | |
| | c | Correct substitution or elimination<br>56 20-cent coins<br>46 50-cent coins | M1<br>A1<br>A1 | |
| 7 | a | Gradient = 0 | B1 | |

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| | | | | |
|---|---|---|---|---|
| | b | $\frac{6units}{3units}$<br>$= 2$ | M1<br><br>A1 | |
| 8 | (i) | 7cm | B1 | |
| | (ii) | 3cm | B1 | |
| | (iii) | 90° | B1 | |
| 9 | | One mango cost 1.8<br>He has $20.20 | M1<br>A1 | |
| 10 | a | $p = 4$ , $q = 0$ | B1 B1 | |
| | b | Plotting<br>Scaling<br>Smoothness of curve and curve pass through every point accurately | P1<br>S1<br>C1 | |
| | c(i) | 2.25 ( $\pm 0.15$) | B1 | |
| | (ii) | $-1.8$<br>2.8<br>( $\pm 0.15$) | B1<br><br>B1 | |
| | (iii) | (0.5,6.25) the $y$-coordinate $\pm 0.15$ | B1 | |
| | (iv) | $x = 0.5$ | B1 | |

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