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BEDOK VIEW SECONDARY SCHOOL

MID-YEAR EXAMINATIONS 2015

CANDIDATE
NAME

REGISTER
NUMBER

CLASS

MATHEMATICS

Paper 1

4048/01

5 May 2015

1 hour 15 minutes

Candidates answer on the Question Paper.

Secondary 1 Express

READ THESE INSTRUCTIONS FIRST

Write your 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.

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.

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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 work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 50.

Total	
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Setter: Ms. Toh L.Z.

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Do not turn over the page until you are told to do so.

Answer **all** the questions..

- 1 (a) Express the following numbers, correct to 2 significant figures.

(i) 104.45

Answer (a)(i) [1]

(ii) 19.99

Answer (a)(ii) [1]

(iii) 5.018

Answer (a)(iii) [1]

- (b) Hence, estimate the value of $\frac{104.45 \times (19.99)^2}{(5.018)^3}$, correct to 1 significant figure.

Answer (b) [2]

- 2 (a) State whether the following statements are true or false.

(i) 1 is a prime number.

Answer (a)(i) [1]

(ii) $\sqrt{6}$ is an irrational number.

Answer (a)(ii) [1]

(iii) $\sqrt{121}$ is a rational number.

Answer (a)(iii) [1]

- (b) A number is rounded off to 0.0211, correct to 4 decimal places.
Suggest the smallest value of this number.

Answer (b) [1]

- 3 Arrange the following numbers in ascending order.

$0.\dot{1}\dot{7}$, $0.1\dot{7}$, 0.1777 , 0.178

Answer [2]
smallest largest

- 4 Expressed as the product of its prime numbers,

$$3375 = 3^3 \times 5^3 \text{ and } 32400 = 2^4 \times 3^4 \times 5^2.$$

Using these results, find

- (a) in prime factorization form, the highest common factor of 3375 and 32400,

Answer (a) [1]

- (b) the value of $\sqrt{32400} \div \sqrt[3]{3375}$,

Answer (b) [3]

- (c) the smallest positive integer k , such that $3375k$ is a perfect square.

Answer (c) [1]

- 5 Without the use of a calculator, evaluate the following.
Show your working clearly.

(a) $[(-22) \times (-5) - (-126)] \div [2 - (-2)]$

Answer (a) [2]

(b) $\left(-2\frac{2}{5}\right) \times \frac{5}{6} \div (-14)$

Answer (b) [2]

- 6 Factorise the following expressions completely.

(a) $8x^2 - 12x$

Answer (a) [1]

(b) $x(a - b) - y(b - a)$

Answer (b) [2]

(c) $2bv - 21aw - 14bw + 3av$

Answer (c) [2]

- 7 Given that $x = -2$, $y = 4$ and $z = 5$, evaluate the following.

(a) $8x + 4y - (x^2 - z)$

Answer (a) [3]

(b) $\frac{y - x}{3} + xy^2z$

Answer (b) [2]

- 8 The daily wage of a worker is given by the expression $\$14t$, where t is the number of working hours.

(a) Find the daily wage of the worker when $t = 8$.

Answer (a) \$..... [1]

(b) What do you think the number 14 in the expression stands for?

Answer (b) [1]

- 9 Mr Lim bought p eggs at q cents per dozen. He sold them for r cents each.
 (a) Express the cost of each egg in terms of q .

Answer (a)cents [1]

- (b) Express the profit that he made when he sold all the eggs in terms of p , q and r .

Answer (b)cents [2]

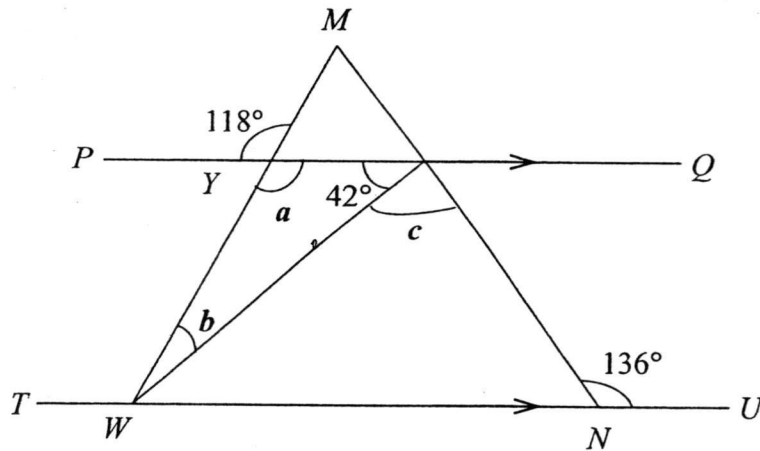
- 10 (a) Simplify $5x - 2y - 3(x - 3y)$.

Answer (a) [2]

- (b) Solve $\frac{2x + 3}{5} + \frac{1 - x}{3} = 0$.

Answer (b) $x =$ [3]

- 11 In the diagram given below, PQ and TU are parallel and WYM and NXM are straight lines. Stating your reasons clearly, determine the values of a , b and c .

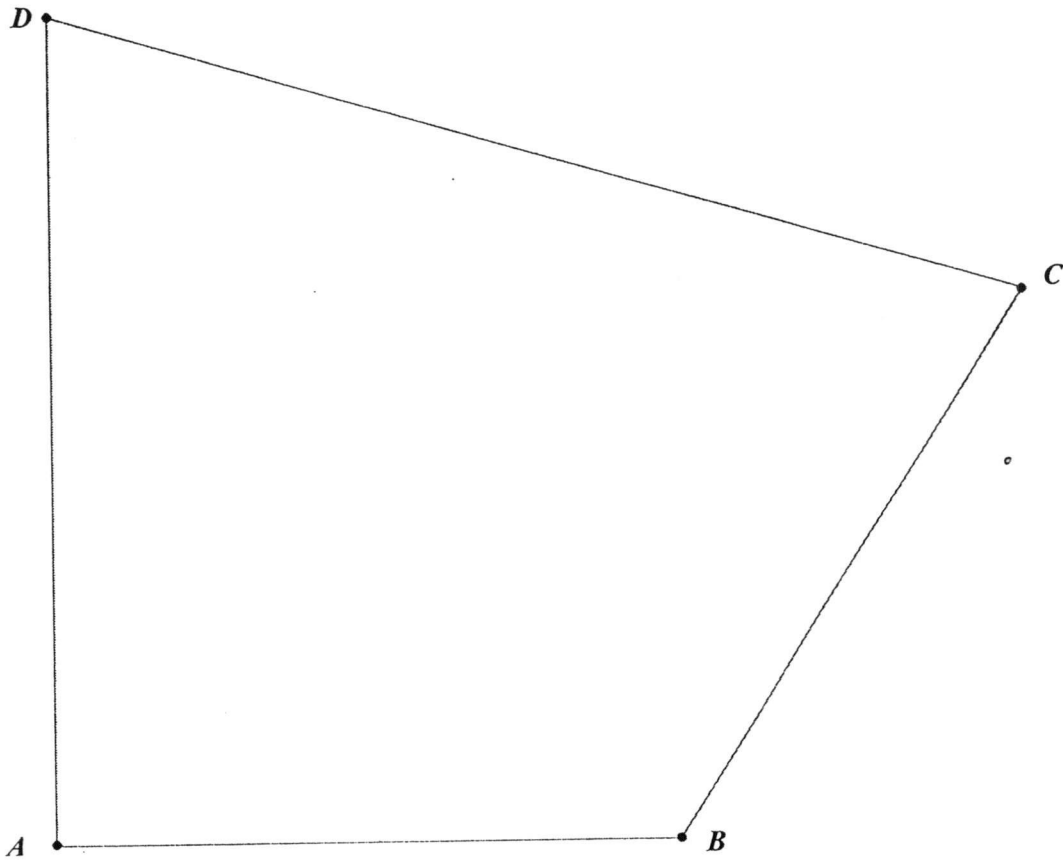


Answer $\angle a = \dots\dots\dots^\circ$ [2]

$\angle b = \dots\dots\dots^\circ$ [2]

$\angle c = \dots\dots\dots^\circ$ [2]

- 12 The following diagram shows a quadrilateral $ABCD$.
- Construct the angle bisector of $\angle BCD$.
 - The angle bisector in part (a) cuts the line AD at a point E . Label point E and measure the length of CE .
 - Construct the perpendicular bisector of the line AB .
 - The bisectors in parts (a) and (b) intersect each other at point F . Label point F .



- | | |
|-------------------------------|-----|
| Answer (a) Construction above | [1] |
| (b) cm | [1] |
| (c) Construction above | [1] |
| (d) Labelled above | [1] |

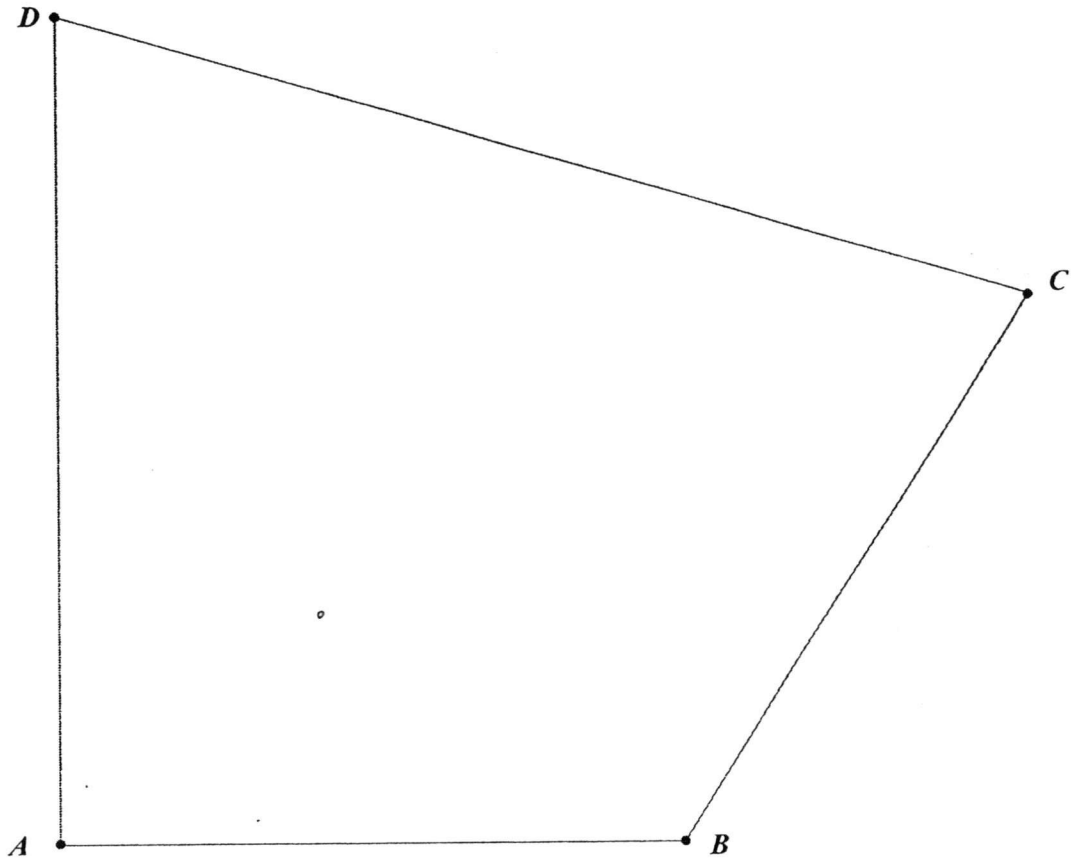
Answer Scheme MY Paper 1

1	(a) (i) 100 (ii) 20 (iii) 5.0 (b) $\frac{100 \times (20)^2}{(5.0)^3}$ = 320 = 300	B1 B1 B1 M1 A1
2	(a) (i) False (ii) True (iii) True (b) 0.02105	B1 B1 B1 B1
3	0.17, 0.1777, 0.17, 0.178	B1: for each pair
4	(a) $3^3 \times 5^2$ (b) $\sqrt[3]{3375} = 3 \times 5$ $\sqrt{32400} = 2^2 \times 3^2 \times 5$ $\frac{2^2 \times 3^2 \times 5}{3 \times 5}$ $= 2^2 \times 3$ $= 12$ (c) $3375k = 3^3 \times 5^3 \times k = 3^4 \times 5^4$ $\therefore k = 3 \times 5 = 15$	B1 M1 M1 A1 B1

5	(a) $[(-22) \times (-5) - (-126)] \div [2 - (-2)]$ $= [110 + 126] \div [2 + 2]$ $= 236 \div 4$ $= 59$ (b) $\left(-2\frac{2}{5}\right) \times \frac{5}{6} \times \left(-\frac{1}{14}\right)$ $= \left(-\frac{12}{5}\right) \times \frac{5}{6} \times \left(-\frac{1}{14}\right)$ $= \left(-\frac{2}{1}\right) \times \left(-\frac{1}{14}\right)$ $= \frac{2}{14}$ $= \frac{1}{7}$	M1 A1 M1 A1
6	(a) $8x^2 - 12x = 4x(2x - 3)$ (b) $x(a - b) + y(a - b)$ $= (a - b)(x + y)$ (c) $2bv - 21aw - 14bw + 3av$ $= 2bv - 14bw - 21aw + 3av$ $= 2b(v - 7w) + 3a(-7w + v)$ $= (2b + 3a)(v - 7w)$	B1 M1 A1 M1 A1
7	(a) $8x + 4y - (x^2 - z)$ $= 8(-2) + 4(4) - [(-2)^2 - 5]$ $= -16 + 16 - (4 - 5)$ $= 1$ (b) $\frac{y - x}{3} + xy^2z$ $= \frac{4 - (-2)}{3} + (-2)(4)^2(5)$ $= 2 - 2(16)(5)$ $= 2 - 160$ $= -158$	M1 M1 A1 M1 A1

8	(a) Daily Wage = $14(8)$ = \$ 112 (b) The worker is being paid \$14 per hour.	B1 B1
9	(a) $\frac{q}{12} \text{ cents}$ (b) Sold all eggs for = pr Cost Price $= p \times \left(\frac{q}{12} \right)$ $= \frac{pq}{12}$ Profit = $pr - \frac{pq}{12}$ or $p \left(r - \frac{q}{12} \right)$ cents	B1 M1 A1
10	(a) $5x - 2y - 3(x - 3y)$ = $5x - 2y - 3x + 9y$ = $2x + 7y$ (b) $\frac{2x+3}{5} + \frac{1-x}{3} = 0$ $\frac{6x+9+5-5x}{15} = 0$ $x + 14 = 0$ $x = -14$	M1 A1 M1 M1 A1
11	$\angle a = 118^\circ$ Reason: Vertically Opposite angle. $\angle b = 180^\circ - 118^\circ - 42^\circ$ Reason: Angle sum of triangle = 20° $\angle c = 136^\circ - 42^\circ$ Reason: alternate angles, parallel lines = 94°	B1, B1 M1 A1 M1 A1

12



(b) 13.8 cm (± 0.1)

B1



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MATHEMATICS

Paper 2

4048/02

7 May 2015

1 hour 30 minutes

Additional Materials: Answer Paper

Secondary 1 Express

READ THESE INSTRUCTIONS FIRST

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Write in dark blue or black pen on both sides of the paper.

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The total number of marks for this paper is 50.

Setter: Miss Ng LL

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7

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Mathematical Formulae*Compound Interest*

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

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

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

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

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard Deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

Answer **all** the questions.

- 1 (a) Express $2\frac{10}{11}$
- (i) as a recurring decimal, [1]
- (ii) as a decimal correct to 5 significant figures. [1]
- (b) Represent the numbers -3^2 , $-\frac{7}{3}$, $\left(\frac{7}{3}\right)^2$, $(-3)^2$ on a number line. [2]
- (c) Write down an inequality connecting -2 and $-\frac{7}{3}$. [1]
-

- 2 (a) **Without using calculator** and showing all your working clearly, evaluate
- (i) $\sqrt{2^{18} \times 5^6 \times 11^4}$, giving your answer in index notation, [1]
- (ii) $\frac{21}{26} - \left(-\frac{2}{5}\right)^2 \div \frac{13}{50}$. [2]
- (b) **Use your calculator** to evaluate $-(-7)^3 \times \left(\frac{5}{3 + \frac{5}{3}}\right) \times \sqrt[3]{26}$. [1]
-

- 3 (a) The number 360 is written as a product of its prime factors, $360 = 2^3 \times 3^2 \times 5$.
- (i) Write 108 as the product of its prime factors. [1]
- (ii) Hence, find the smallest positive value of x such that $108x$ is a multiple of 360. [2]
- (b) Find the smallest positive integer y such that $360y$ is a perfect cube. [2]
- (c) Three comets pass through our solar system every 42 years, 60 years and 330 years respectively. The last time they passed through our solar system together was in the year 1641. When will they next pass through our solar system together? [3]
-

- 4 (a) Simplify the following expressions.
- (i) $3(5a - 2) - (7 - 2a)$ [2]
- (ii) $\frac{2k + 1}{7} - \frac{3k - 2}{2}$ [3]
- (b) Given that $v^2 = u^2 + 2as$, find
- (i) the positive value of v , when $u = 10$, $a = 2$ and $s = 11$, [2]
- (ii) the value of a , when $v = 13$, $u = 20$ and $s = 5$.p [2]
-

- 5 (a) (i) Simplify $18a - 9b + 12a - 6b$. [1]
- (ii) Hence, factorise $18a - 9b + 12a - 6b$ completely. [1]
- (b) Factorise $2bg - 3cg + 6bf - 9cf$ completely. [2]
- (c) Solve the equation $\frac{-3}{4n + 5} = \frac{1}{2n - 3}$. [3]
-

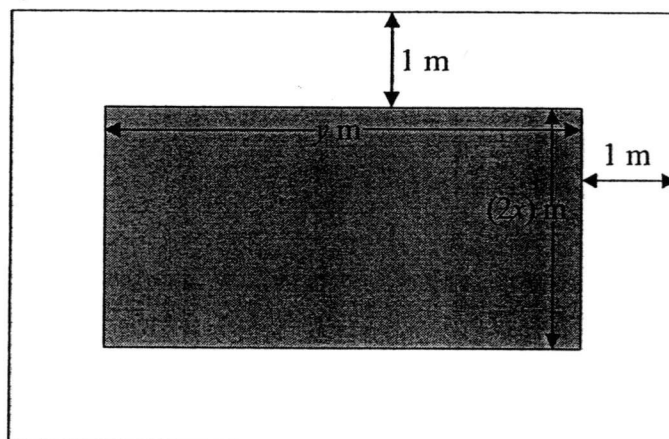
- 6 (a) The table below shows the boiling point of some substances.

Substance	Boiling Point (°C)
Nitrogen	-196
Carbon Dioxide	-78.5
Potassium	760

- (i) When carbon dioxide was at its boiling point, it was heated until its temperature rose by 12°C . Find the new temperature. [1]
- (ii) Find the temperature that is halfway between the boiling point of carbon dioxide and potassium. [1]
- (iii) Find the difference between the boiling point of nitrogen and potassium. [1]
- (b) In a class of 40 students, there are 25 boys and 15 girls. Some girls left the class. Find the number of girls who left the class such that the fraction of the remaining girls in the class becomes $\frac{2}{7}$. [3]
-

- 7 Given that x is an odd number, express the sum of the next three consecutive odd numbers in terms of x . [2]

- 8 A garden has a length of y m and a breadth of $(2x)$ m. It has a uniform path with a width of 1 m along its perimeter.

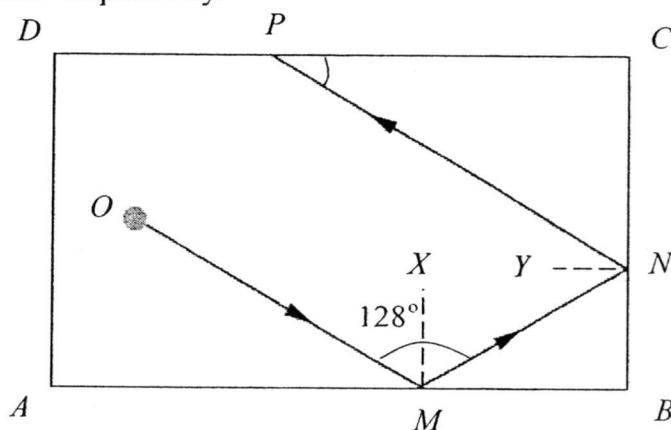


Express and simplify, in terms of x and y ,

- (a) the area of the garden, [1]
 (b) the area of the path. [3]

- 9 The diagram below shows a rectangular billiard table $ABCD$ and a billiard ball at position O moving along the direction of the path $OMNP$.

$\angle OMN = 128^\circ$ and OM is parallel to PN . XM and YN are angle bisectors of $\angle OMN$ and $\angle MNP$ respectively.



- (a) Stating your reasons clearly, find
 (i) $\angle MNP$, [2]
 (ii) $\angle CPN$. [2]
 (b) Find supplementary angle of $\angle CPN$. [1]



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MATHEMATICS

Paper 2

4048/02

7 May 2015

1 hour 30 minutes

Additional Materials: Answer Paper

Secondary 1 Express

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SOLUTIONS

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Setter: Miss Ng LL

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Sec 1E MYE Paper 2 Solutions

1	(ai)	$2\frac{10}{11} = 2.\dot{9}\dot{0}$	A1	-1m for any missing number or arrow																												
	(aii)	$2\frac{10}{11} = 2.9091(5 \text{ s.f.})$	A1																													
	(b)		B2																													
	(c)	$-2 > -\frac{7}{3}$	B1																													
2	(ai)	$\sqrt{2^{18} \times 5^6 \times 11^4} = 2^9 \times 5^3 \times 11^2$	A1																													
	(aii)	$\begin{aligned} \frac{21}{26} - \left(-\frac{2}{5}\right)^2 \div \frac{13}{50} &= \frac{21}{26} - \left(\frac{4}{25}\right) \div \frac{13}{50} \\ &= \frac{21}{26} - \left(\frac{4}{25}\right) \times \frac{50}{13} \\ &= \frac{21}{26} - \frac{8}{13} \\ &= \frac{21}{26} - \frac{16}{26} \\ &= \frac{5}{26} \end{aligned}$	M1																													
	(b)	1090 (3 s.f.)	A1 B1																													
3	(ai)	$108 = 2^2 \times 3^3$	A1																													
	(aii)	LCM of 108 and 360 = $2^3 \times 3^3 \times 5 = 1080$ $108x = 1080$ $x = 10$	M1 A1																													
	(b)	$360y = 2^3 \times 3^2 \times 5y$ $y = 3 \times 5^2$ $= 75$	M1 A1																													
	(c)	<table style="display: inline-table; vertical-align: middle;"> <tr><td>2</td><td>42</td><td>60</td><td>330</td></tr> <tr><td>3</td><td>21</td><td>30</td><td>165</td></tr> <tr><td>2</td><td>7</td><td>10</td><td>55</td></tr> <tr><td>5</td><td>7</td><td>5</td><td>55</td></tr> <tr><td>7</td><td>7</td><td>1</td><td>11</td></tr> <tr><td>11</td><td>1</td><td>1</td><td>11</td></tr> <tr><td></td><td>1</td><td>1</td><td>1</td></tr> </table>	2		42	60	330	3	21	30	165	2	7	10	55	5	7	5	55	7	7	1	11	11	1	1	11		1	1	1	M1
	2	42	60		330																											
3	21	30	165																													
2	7	10	55																													
5	7	5	55																													
7	7	1	11																													
11	1	1	11																													
	1	1	1																													
	LCM = $2 \times 2 \times 3 \times 5 \times 7 \times 11$ $= 4620 \text{ yrs}$ $1641 + 4620 = 6261$ $\therefore$ the comets will pass together in the year 6261.	M1 A1																														
				If ans is 6261 years, deduct under P.																												

4	(ai)	$3(5a - 2) - (7 - 2a) = 15a - 6 - 7 + 2a$ $= 17a - 13$	M1 A1	
	(aii)	$\frac{2k+1}{7} - \frac{3k-2}{2} = \frac{2(2k+1)}{14} - \frac{7(3k-2)}{14}$ $= \frac{4k+2}{14} - \frac{21k-14}{14}$ $= \frac{4k+2 - (21k-14)}{14}$ $= \frac{4k+2 - 21k+14}{14}$ $= \frac{16-17k}{14}$	M1 cao M1 A1	
	(bi)	$v^2 = (10)^2 + 2(2)(11)$ $= 144$ $v = \sqrt{144}$ $= 12$	M1 A1	
	(bii)	$(13)^2 = (20)^2 + 2a(5)$ $169 = 400 + 10a$ $-231 = 10a$ $a = -23.1$	M1 cao A1	
5	(ai)	$18a - 9b + 12a - 6b = 30a - 15b$	A1	
	(aii)	$30a - 15b = 15(2a - b)$	A1	
	(b)	$2bg - 3cg + 6bf - 9cf = g(2b - 3c) + 3f(2b - 3c)$ $= (2b - 3c)(g + 3f)$	M1 A1	
	(c)	$\frac{-3}{4n+5} = \frac{1}{2n-3}$ $-3(2n-3) = 4n+5$ $-6n+9 = 4n+5$ $-10n = -4$ $n = \frac{2}{5} \text{ or } 0.4$	M1 M1 A1	

6	(ai)	new temperature = $-78.5 + 12 = -66.5^{\circ}\text{C}$	A1	
	(aii)	Temperature halfway = $\frac{1}{2}(-78.5 + 760) = 340.75^{\circ}\text{C}$	A1	
	(aiii)	Difference = $760 - (-196) = 956^{\circ}\text{C}$	A1	
	(b)	Let the number of girls who left be x . After the girls left, girls $\rightarrow \frac{15-x}{40-x} = \frac{2}{7}$ $105 - 7x = 80 - 2x$ $5x = 25$ $x = 5$ $\therefore 5$ girls left the class.	M1 M1 A1	
7		Sum = $x + 2 + x + 4 + x + 6$ $= 3x + 12$	M1 A1	
8	(a)	area of garden = $2xy \text{ m}^2$	A1	Units m^2 must be present
	(b)	area of garden and path = $(2x + 2)(y + 2) \text{ m}^2$ area of path = $(2x + 2)(y + 2) - 2xy$ $= 2xy + 4x + 2y + 4 - 2xy$ $= (4x + 2y + 4) \text{ m}^2$	M1 M1 A1	Accept $2(2x + y + 2) \text{ m}^2$
9	(ai)	$\angle MNP = 180 - 128$ $= 52^{\circ}$ (int. $\angle$ s)	M1 A1	M1 for reason
	(aii)	$\angle PNY = \frac{52}{2}$ $= 26^{\circ}$ ($\angle$ bisector) $\angle CPN = \angle PNY$ $= 26^{\circ}$ (alt. $\angle$ s)	M1 A1	M1 for reason
	(b)	supplementary angle of $\angle CPN = 180^{\circ} - 26^{\circ}$ $= 154^{\circ}$	A1	