



**BEATTY SECONDARY SCHOOL
MID-YEAR EXAMINATION 2017**

SUBJECT: Mathematics

LEVEL: Sec 1 Express

PAPER: 1

DURATION: 1 hour 15 minutes

SETTER: Mr Alvin Lim

DATE: 11 May 2017

CLASS:	NAME:	REG NO:
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READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces on the top of this page.

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 on the question paper.

If working is needed for any question, it must be shown with the answer.

Omission of essential working will result in loss of marks.

You are expected to use a scientific calculator to evaluate explicit numerical expressions.

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 paper consists of 7 printed pages (including this cover page).

[Turn over

For
Examiner's
UseAnswer **all** the questions.For
Examiner's
Use

1 Evaluate the following.

(a) $\$11.30 + 26¢ - \2.75

(b) $10 - 3(8 - 5)$

Answer (a) \$ [1]

(b) [1]

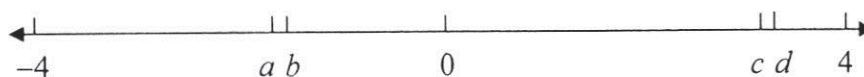
2 Evaluate $\frac{0.8562}{8.593 + 13.89}$. Give your answer correct to

(a) 3 decimal places,

(b) 3 significant figures.

Answer (a) [1]

(b) [1]

3 The numbers a , b , c and d are represented on a number line.It is given that the numbers are π , $-1\frac{2}{3}$, $3.\dot{1}\dot{4}$, $-\sqrt{3}$.Find a , b , c and d .Answer $a = \dots\dots\dots$, $b = \dots\dots\dots$, $c = \dots\dots\dots$, and $d = \dots\dots\dots$ [2]4 By writing each number correct to 1 significant place, estimate the value of $\frac{59.4 \times 0.493}{2.16}$. Show your working clearly.

Answer [2]

For
Examiner's
Use

5 It is given that $x = 4$ and $y = -3$. Evaluate

(a) $5y^2 - xy^3$,

(b) $\frac{x}{y} + \frac{y}{x}$.

Answer (a) [1]

(b) [1]

6 Factorise the following.

(a) $4m - 4n$

(b) $15ax - 20ay + 10a$

Answer (a) [1]

(b) [1]

7 Solve $\frac{9}{2x-5} = 3$.

Answer $x =$ [2]

8 (a) The number of students in Beatty Secondary School is 1300 correct to the nearest hundred. Write down the least possible number of students in the school.

(b) Without using a calculator, estimate the value of $\frac{\sqrt{98}}{20.019}$. Show your working clearly.

Answer (a) [1]

(b) [2]

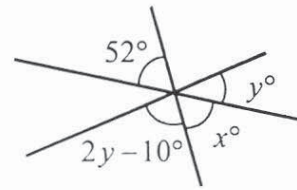
For
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Use

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For
Examiner's
Use

- 9 In the figure, three straight lines intersect at a point. Giving your reasons clearly, find the values of

- (a) x ,
(b) y .



For
Examiner's
Use

Answer (a) $x = \dots\dots\dots$ [1]

(b) $y = \dots\dots\dots$ [2]

- 10 Consider the following numbers.

$$0, \sqrt[3]{2}, 4^2, 27, 29, 0.\dot{7}, 3.21, 1\frac{1}{6}, \frac{\pi}{2}$$

List down all the

- (a) irrational number(s),
(b) composite number(s).
(c) integer(s)

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

(b) $\dots\dots\dots$ [1]

(c) $\dots\dots\dots$ [2]

- 11 Express the following word statements algebraically in their **simplest** form.

- (a) Subtract a from the cube of b .
(b) Divide the product of $2c$ and 3 by the square root of d .
(c) Multiply $3f$ to the sum of $4f$ and $5f$.

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

(b) $\dots\dots\dots$ [1]

(c) $\dots\dots\dots$ [2]

For
Examiner's
Use

For
Examiner's
Use

12 (a) Simplify $\frac{2x-1}{3} - \frac{x}{12}$.

(b) Expand and simplify $3(2x-3) + 4(x-1)$.

Answer (a) [2]

(b) [2]

13 (a) Express 60 and 72 as the product of their prime factors.

(b) Find the lowest common multiple of 60 and 72.

(c) Write down the smallest positive integer, m , such that $60m$ is a perfect square.

(d) Find the smallest positive integer n for which $\frac{72}{n}$ is a perfect cube.

Answer (a) $60 =$ [1]

$72 =$ [1]

(b) [1]

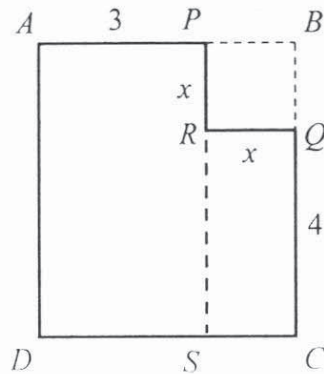
(c) $m =$ [1]

(d) $n =$ [1]

[Turn over

For
Examiner's
Use

- 14 The diagram shows a rectangle $ABCD$ with a square $PBQR$ of side x cm removed. It is given that $AP = 3$ cm and $QC = 4$ cm.



- (a) Find, in terms of x , an expression for the area of the rectangle $RQCS$.
- (b) Find, in terms of x , an expression for the area of the rectangle $APSD$.
- The area of the rectangle $APSD$ is twice the area of the rectangle $RQCS$.
- (c) Form an equation in x and solve it.
- (d) Hence find the area of the rectangle $APSD$.

For
Examiner's
Use

Answer (a) cm^2 [1]

(b) cm^2 [1]

(c) $x =$ [2]

(d) cm^2 [1]

For
Examiner's
Use

- 15** (a) Construct a triangle ABC such that $AC = 8$ cm and angle $ABC = 50^\circ$.
 AB has already been drawn. [2]
- (b) Measure and write down the angle BCA .
- (c) Construct the angle bisector of angle BAC . [1]
- (d) Construct the perpendicular bisector of AB . [1]
- The bisectors in (c) and (d) intersect at the point X .
- (e) Label the point X . [1]
- (f) Construct a circle with centre X and which passes through A and B . [1]
- (g) Write down the radius of the circle.

For
Examiner's
Use

Answer (a), (c), (d), (e), (f)



(b) ° [1]

(g) cm [1]

End of Paper

[Turn over



**BEATTY SECONDARY SCHOOL
MID-YEAR EXAMINATION 2017**

SUBJECT: Mathematics

LEVEL: Sec 1 Express

PAPER: 2

DURATION: 1 hour 30 minutes

SETTER: Mr Alvin Lim

DATE: 12 May 2017

CLASS:	NAME:	REG NO:
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Additional Materials: Writing paper

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number in the spaces on the top of this page.

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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 paper consists of **4** printed pages (including this cover page)
Answer all the questions

[Turn over

- 1 The numbers A , B and C , written as the products of their prime factors, are given below.

$$A = 2^2 \times 3^4 \times 5^2$$

$$B = 2^4 \times 3^6 \times 5^2$$

$$C = 3^7 \times 5^2 \times 7$$

Giving your answers in **index notation**, find

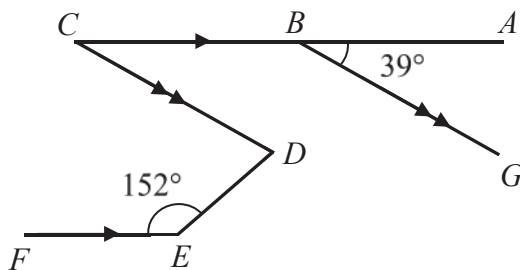
- (a) the highest common factor of A and B , [1]
- (b) the lowest common multiple of A and C , [1]
- (c) the square root of B . [1]
- 2 The local time of Rio de Janeiro in Brazil and that of Singapore is GMT -3 and GMT $+8$ respectively. The World Cup soccer final game is played at 16 00 on 13 July in Rio de Janeiro.
- (a) Find the local time and date in Singapore when the soccer game is played. [1]
- (b) It takes 30 hours to travel from Singapore to Rio de Janeiro. Mr Beatty departs from Singapore on 12 July at 17 00 to Rio de Janeiro. Find out if he is in time to watch the soccer game. [2]
- 3 At the school Sports Day, $\frac{11}{15}$ of the audience were students, $\frac{1}{4}$ of the remainder were parents and the rest were teachers, What fraction were teachers? [3]
- 4 The smallest of three consecutive odd numbers is x .
- (a) Express the sum of the three consecutive odd numbers in terms of x . [1]
- (b) Find the largest number if the sum is 321. [2]
- 5 (a) **Without using a calculator**, express $\frac{5}{18}$ as a recurring decimal. [2]
- (b) Find the fraction that is exactly halfway between $\frac{4}{5}$ and $\frac{4}{6}$. Give your answer in its simplest form. [2]

- 6 The salary of a car salesman with Company A includes a fixed monthly amount of \$1 250 and an additional \$650 for every car that he sells.

Another car sales salesman with Company B does not have a fixed component in his salary and is paid \$875 for every car that he sells.

In a particular month, both salesmen sold n cars.

- (a) Express, in terms of n , the monthly salary of the salesman with company A . [1]
- (b) Express, in terms of n , the monthly salary of the salesman with company B . [1]
- (c) If both of them sold 6 cars in a particular month, deduce which company's salary package is more attractive. [3]
- 7 In the figure, angle $ABG = 39^\circ$, angle $FED = 152^\circ$, $AC \parallel EF$ and B is a point on AC such that $BG \parallel CD$.



Giving your reasons, find

- (a) reflex angle ACD , [2]
- (b) acute angle CDE , [3]
- 8 (a) A school has both primary and secondary sections. The bell of the primary section goes off every 30 minutes while the bell of the secondary section goes off every 35 minutes. The first bell at both primary and secondary sections goes off at 07 30.
- When will the bells of both schools next go off at the same time? [3]
- (b) Amy wants to pack 56 apples, 72 bananas and 104 cherries into as many fruit Bags as possible without leaving any fruit unpacked. Every fruit bag must contain the same number of apples, bananas and cherries.
- Find
- (i) the greatest number of fruit bags that can be packed, [3]
- (ii) the number of cherries in each fruit bag. [1]

[Turn over

- 9 (a) Express $\frac{x+4}{6} + \frac{x}{9} - x$ as a single fraction. [3]
- (b) Simplify $4a - 3b + 8 - [3(a - b) + 2]$. [3]
- (c) (i) Factorise $ax - ya$. [1]
- (ii) Hence, without the use of a calculator, find the value of $321 \times 37 - 27 \times 321$ [1]
- 10 Solve
- (a) $x^3 = 661 - 4(9 + x^3)$, [3]
- (b) $\frac{2}{2x-5} = \frac{3}{5-x}$, [3]
- (c) $\frac{3x}{5} - \frac{x+1}{3} = 5$. [3]

End of Paper



**BEATTY SECONDARY SCHOOL
MID-YEAR EXAMINATION 2017**

SUBJECT: Mathematics

LEVEL: Sec 1 Express

PAPER: 1

DURATION: 1 hour 15 minutes

SETTER: Mr Alvin Lim

DATE: 11 May 2017

CLASS:	NAME:	REG NO:
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Examiner's
Use

Answer **all** the questions.

For
Examiner's
Use

1 Evaluate the following.

(a) $\$11.30 + 26\text{¢} - \2.75

(b) $10 - 3(8 - 5)$

Answer (a) \$ 8.81 [B1] [1]

(b) 1 [B1] [1]

2 Evaluate $\frac{0.8562}{8.593 + 13.89}$. Give your answer correct to

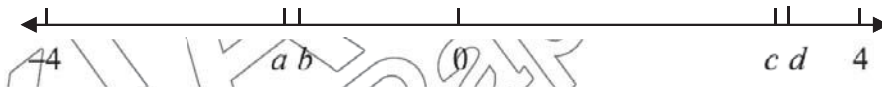
(a) 3 decimal places,

(b) 3 significant figures.

Answer (a) 0.038 [B1] [1]

(b) 0.0381 [B1] [1]

3 The numbers a, b, c and d are represented on a number line.



It is given that the numbers are $\pi, -1\frac{2}{3}, 3.\dot{1}4, -\sqrt{3}$.

Find a, b, c and d .

Answer $a = -\sqrt{3}$, $b = -1\frac{2}{3}$, $c = 3.\dot{1}4$, and $d = \pi$ [B2] (2 correct, 1 mark) [2]

4 By writing each number correct to 1 significant place, estimate the value of $\frac{59.4 \times 0.493}{2.16}$. Show your working clearly.

$$\frac{59.4 \times 0.493}{2.16} = \frac{60 \times 0.5}{2} \quad [\text{M1}]$$

$$= 15 \quad [\text{A1}]$$

Answer [2]

For
Examiner's
Use

For
Examiner's
Use

5 It is given that $x = 4$ and $y = -3$. Evaluate

(a) $5y^2 - xy^3$,

(b) $\frac{x}{y} + \frac{y}{x}$.

(a) $5 \times (-3)^2 - 4 \times (-3)^3 = 5 \times 9 - 4 \times (-27)$
 $= 153$ [B1]

(b) $\frac{4}{-3} + \frac{-3}{4} = -\frac{4}{3} - \frac{3}{4}$
 $= -2\frac{1}{12}$ [B1]

Answer (a) [1]

(b) [1]

6 Factorise the following.

(a) $4m - 4n$

(b) $15ax - 20ay + 10a$

Answer (a) $4(m - n)$ [B1] [1]

(b) $5a(3x - 4y + 2)$ [B1] [1]

7 Solve $\frac{9}{2x-5} = 3$.

$\frac{9}{2x-5} = 3$
 $9 = 3(2x - 5)$ [M1]
 $9 = 6x - 15$
 $6x = 24$
 $x = 4$ [A1]

Answer $x =$ [2]

8 (a) The number of students in Beatty Secondary School is 1300 correct to the nearest hundred. Write down the least possible number of students in the school.

(b) Without using a calculator, estimate the value of $\frac{\sqrt{98}}{20.019}$. Show your working clearly.

(a) 1250 [B1]

(b) $\frac{\sqrt{98}}{20.019} \approx \frac{\sqrt{100}}{20}$ [M1]
 $= \frac{10}{20} = \frac{1}{2}$ [A1]

Answer (a) [1]

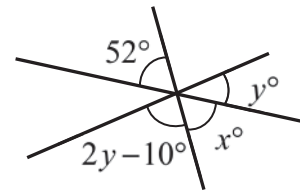
(b) [2]

[Turn over

For
Examiner's
Use

For
Examiner's
Use

9 In the figure, three straight lines intersect at a point. Giving your reasons clearly, find the values of



(a) x ,

(b) y .

(a) $x = 52^\circ$ (vert opp \angle s) [A1]

(b) $x + y + 2y - 10^\circ = 180^\circ$ (adj \angle s on a str line) [M1]

$$52^\circ + 3y - 10^\circ = 180^\circ$$

$$3y = 180^\circ - 42^\circ$$

$$= 138^\circ$$

$$y = 46^\circ$$
 [A1]

Answer (a) $x = \dots\dots\dots$ [1]

(b) $y = \dots\dots\dots$ [2]

10 Consider the following numbers.

$$0, \sqrt[3]{2}, 4^2, 27, 29, 0.\dot{7}, 3.2\dot{1}, 1\frac{1}{6}, \frac{\pi}{2}$$

List down all the

(a) irrational number(s),

(b) composite number(s).

(c) integer(s)

Answer (a) $\sqrt[3]{2}, \frac{\pi}{2}$ [B1] $\dots\dots\dots$ [1]

(b) $27, 4^2$ [B1] $\dots\dots\dots$ [1]

(c) $0, 4^2, 27, 29$ [B2] $\dots\dots\dots$ [2]

11 Express the following word statements algebraically in their **simplest** form.

(a) Subtract a from the cube of b .

(b) Divide the product of $2c$ and 3 by the square root of d .

(c) Multiply $3f$ to the sum of $4f$ and $5f$.

(a) $b^3 - a$ [B1]

(b) $\frac{6c}{\sqrt{d}}$ [B1]

(c) $3f \times (4f + 5f)$ [M1]
 $= 3f \times 9f$
 $= 27f^2$

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

(b) $\dots\dots\dots$ [1]

(c) $\dots\dots\dots$ [2]

For
Examiner's
Use

For
Examiner's
Use

12 (a) Simplify $\frac{2x-1}{3} - \frac{x}{12}$.

(b) Expand and simplify $3(2x-3)+4(x-1)$.

$$\begin{aligned} (a) \quad \frac{2x-1}{3} - \frac{x}{12} &= \frac{4(2x-1)}{12} - \frac{x}{12} \quad [\text{M1}] \\ &= \frac{8x-4}{12} - \frac{x}{12} \\ &= \frac{7x-4}{12} \quad [\text{A1}] \end{aligned}$$

$$\begin{aligned} (b) \quad 3(2x-3)+4(x-1) &= 6x-9+4x-4 \quad [\text{M1}] \\ &= 10x-13 \quad [\text{A1}] \end{aligned}$$

Answer (a) [2]

(b) [2]

13 (a) Express 60 and 72 as the product of their prime factors.

(b) Find the lowest common multiple of 60 and 72.

(c) Write down the smallest positive integer, m , such that $60m$ is a perfect square.

(d) Find the smallest positive integer n for which $\frac{72}{n}$ is a perfect cube.

$$\begin{aligned} (a) \quad 60 &= 2^2 \times 3 \times 5 \quad [\text{B1}] \\ 72 &= 2^3 \times 3^2 \quad [\text{B1}] \end{aligned}$$

$$(b) \quad 2^2 \times 3^2 \times 5 = 360 \quad [\text{B1}]$$

$$(c) \quad 3 \times 5 = 15 \quad [\text{B1}]$$

$$(d) \quad n = 3^2 = 9 \quad [\text{B1}]$$

Answer (a) 60 = [1]

72 = [1]

(b) [1]

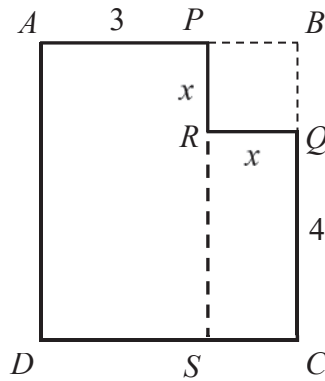
(c) m = [1]

(d) n = [1]

[Turn over

For
Examiner's
Use

- 14 The diagram shows a rectangle $ABCD$ with a square $PBQR$ of side x cm removed. It is given that $AP = 3$ cm and $QC = 4$ cm.



For
Examiner's
Use

- (a) Find, in terms of x , an expression for the area of the rectangle $RQCS$.
- (b) Find, in terms of x , an expression for the area of the rectangle $APSD$.
- The area of the rectangle $APSD$ is twice the area of the rectangle $RQCS$.
- (c) Form an equation in x and solve it.
- (d) Hence find the area of the rectangle $APSD$.

(a) Area of rectangle $RQCS = 4 \times x$
 $= 4x \text{ cm}^2$ [A1]

(b) Area of rectangle $APSD = 3 \times (4 + x)$
 $= 12 + 3x \text{ cm}^2$ [A1] o.e.

(c) Area of the $APSD = 2 \times (\text{Area of } RQCS)$
 $12 + 3x = 2 \times 4x$ [M1]
 $12 + 3x = 8x$
 $5x = 12$
 $x = 2.4$ [A1]

(d) Area of rectangle $APSD = 12 + 3(2.4)$
 $= 19.2 \text{ cm}^2$ [A1]

Answer (a) cm^2 [1]

(b) cm^2 [1]

(c) $x =$ [2]

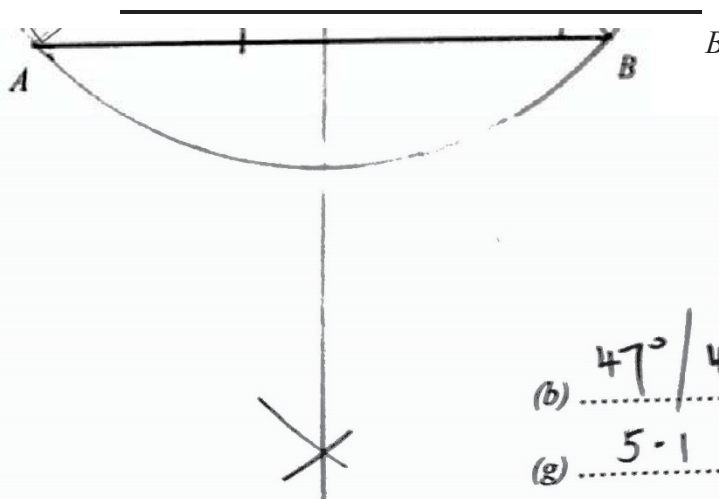
(d) cm^2 [1]

For
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- 15 (a) Construct a triangle ABC such that $AC = 8$ cm and angle $ABC = 50^\circ$. AB has already been drawn. [2]
- (b) Measure and write down the angle BCA .
- (c) Construct the angle bisector of angle BAC . [1]
- (d) Construct the perpendicular bisector of AB . [1]
- The bisectors in (c) and (d) intersect at the point X .
- (e) Label the point X . [1]
- (f) Construct a circle with centre X and which passes through A and B . [1]
- (g) Write down the radius of the circle.

For
Examiner's
Use

Answer (a), (c), (d), (e), (f)



(accept 46-49)

(b) $47^\circ / 48^\circ$ [1]

(g) 5.1 cm [1]
(accept ± 0.2)

[Turn over

Paper 2 Solutions

- 1(a) $HCF = 2^2 \times 3^4 \times 5^2$ [B1]
 (b) $LCM = 2^2 \times 3^7 \times 5^2 \times 7$ [B1]
 (c) Square root of $B = 2^2 \times 3^3 \times 5$ [B1]

- 2(a) Time difference = $8+3 = 11$ hours

Rio de Janeiro 16 00, 13 July

$$1600 + 1100 = 2700$$

$$2700 - 2400 = 0300 (+1)$$

\therefore Singapore 0300, 14 July [A1]

- (b) Flight time = $30\text{h} = 1\text{day } 6\text{h}$

Reached Rio de Janeiro at Singapore time:
 12 July at 17 00 + 1 day 6h = 13 July 2300

OR

Reached Rio de Janeiro at Rio de Janeiro time:
 13 July 2300 - 1100 = 13 July 1200

\therefore he is in time to watch the soccer game. [A2]

3

Fraction that were teachers & parents = $1 - \frac{11}{15}$ [M1]

$$= \frac{4}{15}$$

Fraction that were parents = $\frac{1}{4} \times \frac{4}{15}$ [M1]

$$= \frac{1}{15}$$

Fraction that were teachers = $\frac{4}{15} - \frac{1}{15}$

$$= \frac{3}{15}$$

$$= \frac{1}{5} \quad [A1]$$

$$4(a) \quad x + (x+2) + (x+4) = 3x+6 \quad [B1]$$

$$(b) \quad 3x+6 = 321 \quad [M1]$$

$$3x = 315$$

$$x = 105$$

$$\text{Largest number} = x + 4$$

$$= 105 + 4$$

$$= 109 \quad [A1]$$

$$5(a) \quad 18 \overline{) 50} \quad [M1]$$

$$\underline{-36}$$

$$140$$

$$\underline{-126}$$

$$140$$

$$\underline{-126}$$

$$14$$

$$\frac{5}{18} = 0.2\dot{7} \quad [A1]$$

$$(b) \quad \left(\frac{4}{5} + \frac{4}{6}\right) \div 2 \quad [M1]$$

$$= \frac{11}{15} \quad [A1]$$

$$6(a) \quad \$(1\,250 + 650n) \quad [B1]$$

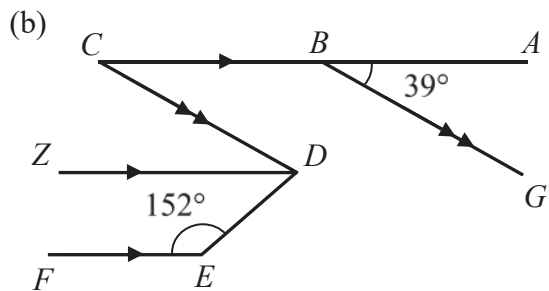
$$(b) \quad \$875n \quad [B1]$$

$$(c) \quad \$(1\,250 + 650 \times 6) = \$5150 \quad [M1]$$

$$\$875 \times 6 = \$5\,250 \quad [M1]$$

$$\text{Company B, } \$5\,250 > \$5\,150 \quad [A1]$$

7(a) $\angle BCD = 39^\circ$ (corr. \angle s) [M1]
 Reflex $\angle ACD = 360^\circ - 39^\circ$ (\angle s at a point)
 $= 321^\circ$ [A1]



Draw line $ZD \parallel$ to FE and CA .

$\angle CDZ = 39^\circ$ (alt. \angle s) [M1]

$\angle EDZ = 180^\circ - 152^\circ$ (int \angle s) [M1]
 $= 28^\circ$

$\angle CDE = 39^\circ + 28^\circ = 67^\circ$ [A1]

8(a)
 $30 = 2 \times 3 \times 5$
 $35 = 5 \times 7$
 $\text{LCM} = 2 \times 3 \times 5 \times 7 = 210$ [M1]

$210 \text{ min} = 3\text{h}30\text{min}$

$07\ 30 + 03\ 30$ [M1]
 $= 11\ 00$ [A1]

(b)(i) $56 = 2^3 \times 7$
 $72 = 2^3 \times 3^2$
 $104 = 2^3 \times 13$ [M2]
 $\text{HCF} = 2^3 = 8$ [A1]

(ii) No. of cherries $104 \div 8 = 13$ [A1]

9(a) $\frac{x+4}{6} + \frac{x}{9} - x$
 $= \frac{3 \times (x+4)}{18} + \frac{2 \times x}{18} - \frac{18x}{18}$ [M1]

$= \frac{3x+12+2x-18x}{18}$ [M1]

$= \frac{12-13x}{18}$ [A1]

(b) $4a - 3b + 8 - [3(a-b) + 2]$
 $= 4a - 3b + 8 - [3a - 3b + 2]$ [M1]

$= 4a - 3b + 8 - 3a + 3b - 2$ [M1]

$= a + 6$ [A1]

(c)(i) $ax - ya = a(x - y)$ [B1]

(ii) $321 \times 37 - 27 \times 321 = 321(37 - 27)$
 $= 321 \times 10$
 $= 3210$ [A1]

10(a)

$x^3 = 661 - 4(9 + x^3)$

$x^3 = 661 - 36 - 4x^3$ [M1]

$5x^3 = 625$ [M1]

$x^3 = 125$

$x = \sqrt[3]{125}$
 $= 5$ [A1]

(b)

$\frac{2}{2x-5} = \frac{3}{5-x}$

$2(5-x) = 3(2x-5)$ [M1]

$10 - 2x = 6x - 15$

$-8x = -25$ [M1]

$x = 3\frac{1}{8}$ [A1]

(c)

$\frac{3x}{5} - \frac{x+1}{3} = 5$

$\frac{3 \times 3x}{15} - \frac{5(x+1)}{15} = \frac{75}{15}$ [M1]

$\frac{9x}{15} - \frac{(5x+5)}{15} = \frac{75}{15}$

$9x - 5x - 5 = 75$ [M1]

$4x = 80$

$x = 20$ [A1]

