

For
Examiner's
Use

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Answer all questions.

- 1
- (a) Find the fraction which is exactly halfway between $\frac{1}{8}$ and $\frac{4}{8}$.
- (b) Express the fraction $1\frac{3}{8}$ as a percentage.

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

(b).....% [1]

- 2 An integer is estimated as 3000 when it is rounded off to one, two or three significant figures. Find the

- (a) maximum possible value of the integer,
(b) minimum possible value of the integer.

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

(b)..... [1]

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- 3 A stack of two-dollar notes, worth \$6000 is 12 cm thick. Find the thickness of a two-dollar note
- (a) in centimetres, giving your answer as a decimal.
 (b) in metres, giving your answer in standard form.

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

(b).....m [2]

- 4 (a) Find the smallest possible value of w if it leaves a remainder of one when divided by 2, 3 or 5.
- (b) Expressed as the product of prime factors,
 $18 = 2 \times 3^2$ and $45 = 3^2 \times 5$.
 Use the results to find
- (i) the smallest integer, k , such that $18k$ is a perfect cube,
 (ii) the highest common factor of 18 and 45.

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

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

(b)(ii)..... [1]

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- 5 (a) Expand and simplify $2b(a+b) - a(a-b)$.
- (b) Express $\frac{3f-g}{f+2g} - 1$ as a single fraction in its simplest form.

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

(b)..... [3]

- 6 (a) Factorise completely $3a(x-y) - (y-x)$.
- (b) Solve the equation $\frac{a}{a+3} = 1\frac{1}{4}$.

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

(b)..... [2]

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- 7 (a) Given that $x : y = 5 : 6$ and $y : w = 8 : 11$, find $x : y : w$.
- (b) Vinegar and water are mixed in the ratio 1 : 4 by volume. If the volume of the solution is 900 cm^3 ,
- find the volume of vinegar in the solution,
 - how much vinegar must be added to the solution so that the ratio of vinegar to water in the solution becomes 1 : 3 by volume ?

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

(b)(i)..... cm^3 [1](b)(ii)..... cm^3 [2]

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8 (a) Find the smallest integer y that satisfies the inequality $6y > -54$.

(b)(i) Solve $\frac{1}{5}x - \frac{2}{3}x > -7$.

(ii) Hence, find the largest possible value of x if x is a prime number.

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

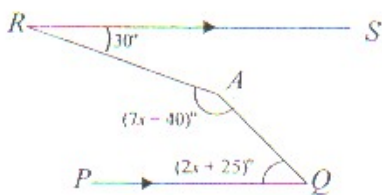
(b)(i)..... [2]

(b)(ii)..... [1]

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- 9 In the figure, $RS \parallel PQ$, $\angle SRA = 30^\circ$, $\angle RAQ = (7x - 40)^\circ$ and $\angle AQP = (2x + 25)^\circ$. Find the value of x .

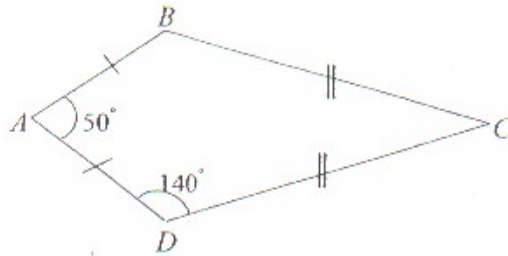
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Answer [4]

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- 10 In the diagram, $ABCD$ is a quadrilateral in which $AB = AD$, $BC = CD$, $\angle BAD = 50^\circ$ and $\angle ADC = 140^\circ$.

- (a) Find $\angle BCD$.
 (b) What is the special name given to quadrilateral $ABCD$?

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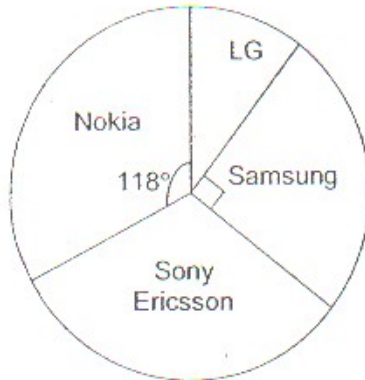
Answer (a)..... [2]

(b)..... [1]

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- 11 The following pie chart shows the brand of mobile phones owned by a group of teenagers.



- (a) Write down the fraction of teenagers who own a Samsung mobile phone.
- (b) The number of teenagers who own a Sony Ericsson mobile phone is three times more than the number of teenagers who own a LG phone. Calculate the angle of the sector which represents the number of teenagers who own a Sony Ericsson mobile phone.
- (c) Calculate the total number of teenagers in the group if the number of teenagers who own a Nokia mobile phone is 24 more than those who own a Sony Ericsson mobile phone.

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

(b)..... [3]

(c)..... [2]

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- 12 Construct a quadrilateral $PQRS$ where $PQ = 6.5$ cm, $QR = 4.8$ cm, $RS = 8.5$ cm, $\angle PQR = 75^\circ$ and $\angle QRS = 98^\circ$.

On the same diagram, construct

- (a)(i) the perpendicular bisector of PS ,
(ii) the angle bisector of $\angle PSR$.

- (b) Mark the point X where these two bisectors meet. Measure the length of PX .

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Answer (b) $PX = \dots\dots\dots$ cm [5]

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Answer all questions.

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- 1
- (a) Find the fraction which is exactly halfway between $\frac{1}{8}$ and $\frac{4}{8}$.
- (b) Express the fraction $1\frac{3}{8}$ as a percentage.

(a) Required fraction = $\frac{2+3}{8} \times \frac{1}{2}$ or $\frac{1+4}{8} \times \frac{1}{2}$ MI
 $= \frac{5}{16}$ AI

(b) $\frac{11}{8} \times 100\% = 137.5\%$ or $137\frac{1}{2}\%$ AI

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

(b).....% [1]

- 2 An integer is estimated as 3000 when it is rounded off to one, two or three significant figures. Find the
- (a) maximum possible value of the integer,
- (b) minimum possible value of the integer.

(a) maximum possible value = 3004 BI

(b) minimum possible value = 2995 BI

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

(b)..... [1]

- 3 A stack of two-dollar notes, worth \$6000 is 12 cm thick. Find the thickness of a two-dollar note
- (a) in centimetres, giving your answer as a decimal.
- (b) in metres, giving your answer in standard form.

(a) Thickness of one piece of two-dollar note = $\frac{12}{3000}$
 $= 0.004$ cm AI

(b) 0.004 cm = 0.00004 m MI
 $= 4 \times 10^{-5}$ m AI

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

(b).....m [2]

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- 4 (a) Find the smallest possible value of w if it leaves a remainder of 1 when divided by 2, 3 or 5.
- (b) Expressed as the product of prime factors,
 $18 = 2 \times 3^2$ and $45 = 3^2 \times 5$.
 Use the results to find
- (i) the smallest integer, k , such that $18k$ is a perfect cube,
 (ii) The highest common factor of 18 and 45.

(a) LCM of 2,3,5 is 30 M1
 $w = 30 + 1$
 $= 31$ A1

(b)(i) $18k = 2 \times 3^2 \times 2^2 \times 3$ M1
 $k = 12$ A1

(b)(ii) HCF of 18 and 45 = 9 A1

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

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

(b)(ii)..... [1]

- 5 (a) Expand and simplify $2b(a + b) - a(a - b)$.
- (b) Express $\frac{3f - g}{f + 2g} - 1$ as a single fraction in its simplest form.

(a) $2b(a + b) - a(a - b) = 2ab + 2b^2 - a^2 + ab$ M1
 $= 3ab + 2b^2 - a^2$ A1

(b) $\frac{3f - g}{f + 2g} - 1 = \frac{3f - g - (f + 2g)}{f + 2g}$ M1 - single fraction
 $= \frac{3f - g - f - 2g}{f + 2g}$ M1 - expand correctly
 $= \frac{2f - 3g}{f + 2g}$ A1

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

(b)..... [3]

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6 (a) Factorise completely $3a(x-y) - (y-x)$.

(b) Solve the equation $\frac{a}{a+3} = 1\frac{1}{4}$.

a) $3a(x-y) - (y-x) = 3a(x-y) + (x-y)$ M1 (changing terms in 2nd bracket)
 $= (x-y)(3a+1)$ A1

(b) $\frac{a}{a+3} = 1\frac{1}{4}$

$\frac{a}{a+3} = \frac{5}{4}$

$4a = 5(a+3)$

$a = -15$

M1 – cross multiply

A1

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

(b)..... [2]

7 (a) Given that $x : y = 5 : 6$ and $y : w = 8 : 11$, find $x : y : w$.

(b) Vinegar and water are mixed in the ratio 1 : 4 by volume. If the volume of the solution is 900 cm^3 ,

(i) find the volume of vinegar in the solution,

(ii) how much vinegar must be added to the solution so that the ratio of vinegar to water in the solution becomes 1 : 3 by volume ?

(a) $x : y = 5 : 6$ $y : w = 8 \times 3 : 11 \times 3$ M1 (multiply ratio with LCM of original values of y)
 $= 5 \times 4 : 6 \times 4$ $= 24 : 33$
 $= 20 : 24$

$x : y : w = 20 : 24 : 33$ A1

(b) (i) Vol of vinegar $= 900 \times \frac{1}{5}$
 $= 180 \text{ cm}^3$ A1

(b)(ii) Let $x \text{ cm}^3$ be the vol of vinegar added.

Vol of water $= 720 \text{ cm}^3$

$\frac{180+x}{720} = \frac{1}{3}$ M1

$540 + 3x = 720$

$x = 60 \text{ cm}^3$ A1

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

(b)(i)..... cm^3 [1]

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

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8 (a) Find the smallest integer y that satisfies the inequality $6y > -54$.

(b)(i) Solve $\frac{1}{5}x - \frac{2}{3}x > -7$.

(ii) Hence, find the largest possible value of x if x is a prime number.

(a) $6y > -54$ $y_{\text{smallest}} = -8$ A1
 $y > -9$ M1

(b)(i) $\frac{1}{5}x - \frac{2}{3}x > -7$ $7x < 105$ M1---changing sign
 $x < 15$ A1

$\frac{x(3) - 2x(5)}{15} > -7$

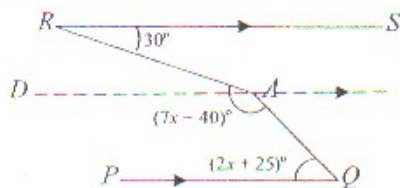
(ii) largest possible value of $x = 13$ A1

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

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

(b)(ii)..... [1]

9 In the figure, $RS \parallel PQ$, $\angle SRA = 30^\circ$, $\angle RAQ = (7x - 40)^\circ$ and $\angle AQP = (2x + 25)^\circ$. Find the value of x .



$\angle RAD = 30^\circ$ (alt \angle s, $RS \parallel PQ$) M1 (use of alt. angles)

$\angle DAQ = (7x - 40)^\circ - 30^\circ$ M1
 $= (7x - 70)^\circ$

$\angle DAQ + \angle AQP = 180^\circ$ (int \angle s, $DA \parallel PQ$) M1 (use of int. angles) or (use of adj. angles on a str. line)

$(7x - 70)^\circ + (2x + 25)^\circ = 180^\circ$

$(9x - 45)^\circ = 180^\circ$

$9x^\circ = 225^\circ$

$x = 25$

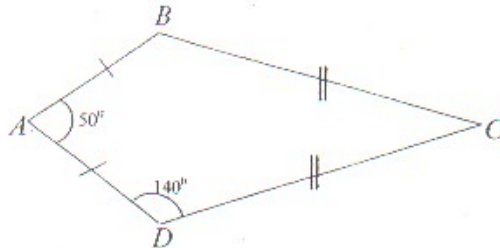
A1

Answer [4]

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- 10 In the diagram, $ABCD$ is a quadrilateral in which $AB = AD$, $BC = CD$, $\angle BAD = 50^\circ$ and $\angle ADC = 140^\circ$
- (a) Find $\angle BCD$.
- (b) What is the special name given to quadrilateral $ABCD$?



$$\angle ADB = \frac{180^\circ - 50^\circ}{2} \text{ (base } \angle \text{ s isos } \Delta)$$

$$= 65^\circ$$

$$\angle CDB = 140^\circ - 65^\circ$$

$$= 75^\circ$$

$$\angle BCD = 180^\circ - 75^\circ - 75^\circ \text{ (} \angle \text{ s sum of } \Delta)$$

$$= 30^\circ \text{ A1}$$

Or $50^\circ + 140^\circ + 140^\circ + \angle BCD = 360^\circ$
(sum of int angles of a quad) M1

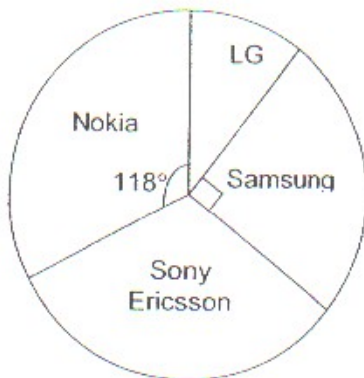
$$\angle BCD = 30^\circ \text{ A1}$$

Quad $ABCD$ is a kite. A1

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

(b)..... [1]

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- (a) Write down the fraction of teenagers who own a Samsung mobile phone.
- (b) If the number of teenagers who own a Sony Ericsson mobile phone is three times more than the number of teenagers who own a LG phone. Calculate the angle of the sector which represents the number of teenagers who own a Sony Ericsson mobile phone.
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(a) fraction of teenagers who own a Samsung phone = $\frac{1}{4}$ A1

(b) $3x + x = 360^\circ - 90^\circ - 118^\circ$ M1

$$x = \frac{152}{4}$$

$$x = 38^\circ \quad \text{A1}$$

angle of sector (Sony Ericsson) = 114° A1

(c) Difference = $(118 - 114)^\circ$
= 4°

Total number of teenagers = $\frac{24}{4} \times 360$ M1

$$= 2160 \quad \text{A1}$$

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

(b)..... [3]

(c)..... [2]

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On the same diagram, construct

- (a)(i) the perpendicular bisector of PS ,
(ii) the angle bisector of $\angle PSR$.

- (b) Mark the point X where these two bisectors meet. Measure the length of PX .

Construct

- (a) QR ----- 1m
(b) RS ----- 1m
(c) Line bisector ----- 1m
(d) Angle bisector ----- 1m
(e) Length PX ----- 1m