OCR-H Jun'17 P5

Answer **all** the questions.

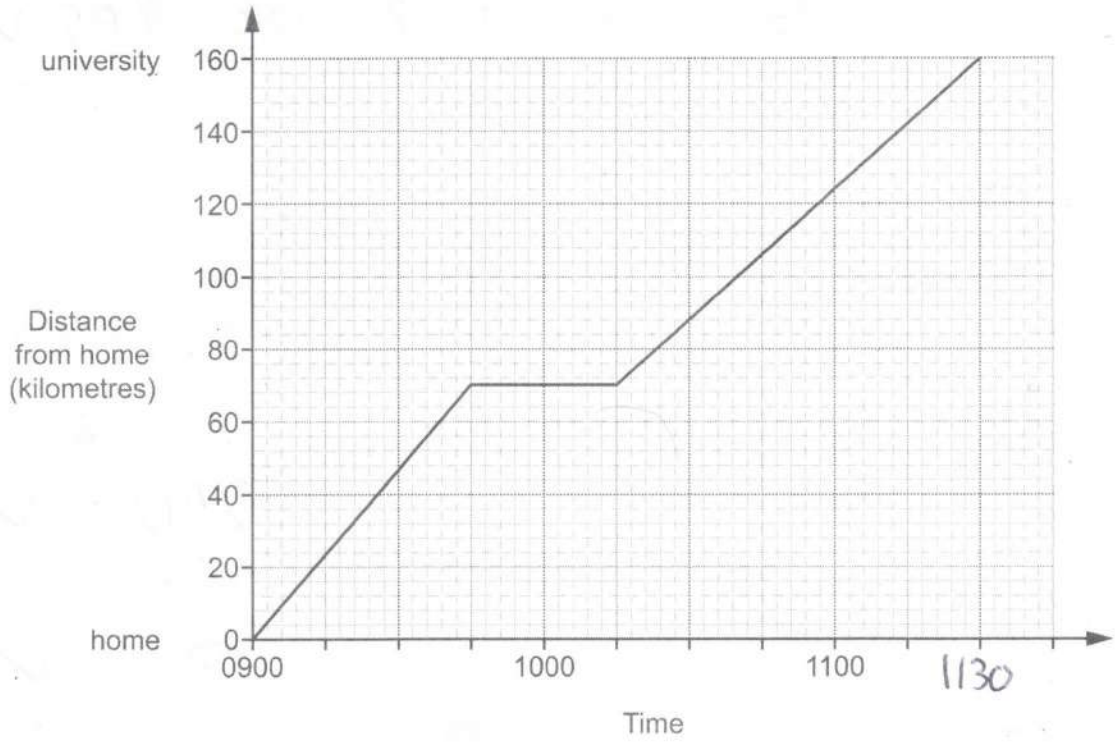
1 Work out $\frac{2}{\cancel{15}} \times \frac{\cancel{15}}{22}$.

Give your answer in its lowest terms.

$\frac{2}{22}$ ✓OE $\frac{1}{11}$ ✓

..... **[2]**

2 The graph shows Mia's journey from her home to university.



Calculate Mia's average speed for the whole journey.

$\frac{160}{2.5} = \frac{1600}{25} = \frac{320}{5}$

✓✓

64 ✓

..... km/h **[3]**

© OCR 2017

3 Last year, Katie earned £16 200.
Her total loan repayments were £6400.

Katie estimates that the ratio of her loan repayments to her earnings is approximately 3 : 8.

Is she correct?
Show your reasoning.

6400 : 16200 ✓

64 : 162

32 : 81 ✓

≈ 30 : 80

= 3 : 8 so Yes ✓

..... [3]

4 Rashid invests money into an account which pays a fixed rate of compound interest each year.
The value, £V, of his investment after t years is given by the formula

$$V = 1250 \times 1.03^t.$$

(a) How much money did Rashid invest?

1250 ✓

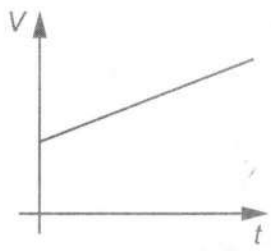
(a) £ ..... [1]

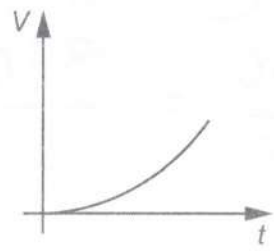
(b) What rate of compound interest is paid each year?

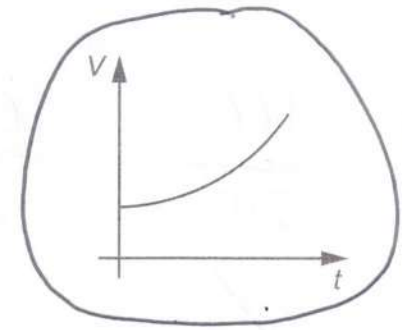
3 ✓

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

(c) Circle the graph that best represents the growth in Rashid's account.







✓

[1]

© OCR 2017

5 **(a)** Rearrange the equation to make x the subject.

$$y = 7x - 3$$

$y + 3 = 7x$ ✓

$\frac{y+3}{7}$ ✓

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

(b) Factorise.

(i) $x^2 - xy$

(b)(i) $x(x-y)$ ✓ ..... [1]

(ii) $x^2 + 8x + 12$

(ii) $(x+6)(x+2)$ ✓✓ ..... [2]

6 Jenny played four games of golf.
For these games her modal score was 76 and her mean score was 75.
Her range of scores was 10.

What were her scores for the four games?

Total = 300 ✓

$300 - 76 - 76 = 148$ ✓

$\frac{148}{2} \pm 5 = 69, 79$

69 ..... 76 ..... 76 ..... 79 ..... ✓✓ [4]

© OCR 2017

7 The population of a village is in the following ratios.

- men : children = 11 : 3
- women : children = 5 : 2

(a) Find the ratio men : women.
Give your answer in its simplest form.

M W C
11 3
x2 ↓ m
22 15 6
5 2
x3

(a) 22 : 15 ✓ [2]

(b) There are 36 children in the village.

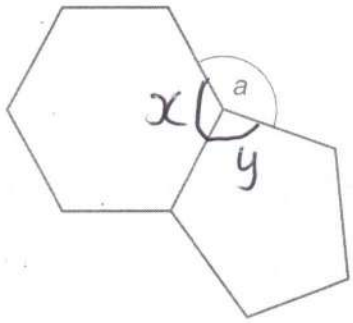
Find the total population of the village.

M W C
(x6) 132 + 90 + 36 ✓✓

(b) 258 ✓ [3]

© OCR 2017

8 Imran joins two tiles together as shown below.
One tile is a regular hexagon and the other tile is a regular pentagon.



Not to scale

(a) Show that angle *a* is 132°.

$x = \frac{(6-2) \times 180}{6} = \frac{720}{6} = 120$ ✓

$y = \frac{(5-2) \times 180}{5} = \frac{540}{5} = 108$ ✓

$a = 360 - 120 - 108 = 132$ ✓ [3]

(b) Imran thinks that another tile in the shape of a regular polygon will fit **exactly** into angle *a*.

Is Imran correct?
Show your reasoning.

$\frac{(n-2) \times 180}{n} = 132$ ✓

$180n - 360 = 132n$ ✓ etc

$48n = 360$

$n = \frac{360}{48}$ → not an integer ✓

so No [3]

© OCR 2017

9 George is the manager of a shoe shop.
He samples 50 of his customers and asks them about the **one** style of shoe they would buy next.
The table shows his results.

Style of shoe	Number of customers
Laced shoes	18
Boots	15
Sandals	8
Trainers	5
Other	4

George buys 1000 pairs of shoes with the number of each style based on his survey results.

How many pairs of sandals should he buy?
Write down any assumption you make about his sample.

$\frac{8}{50} \times 1000 = \frac{800}{5} = 160$ ✓✓

Assuming the sample is representative of the population ✓

[3]

10 (a) Solve the inequality.

$3x - 2 > 10$

$3x > 12$ ✓

$x > 4$ ✓

(a) ..... [2]

(b) Solve.

$6x + 2 = 5 - 4x$

$10x = 3$ ✓✓

$\frac{3}{10}$ ✓OE

(b) $x =$ ..... [3]

© OCR 2017

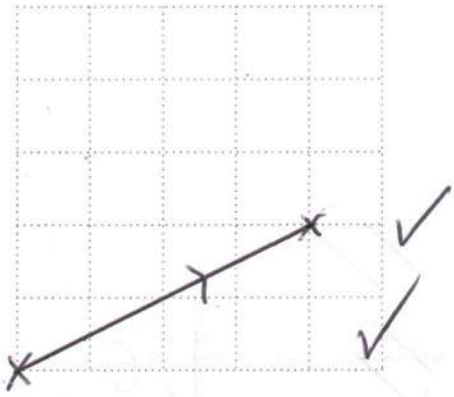
11 Vector $\mathbf{a} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$, vector $\mathbf{b} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$.

(a) On each grid below, draw a vector to represent

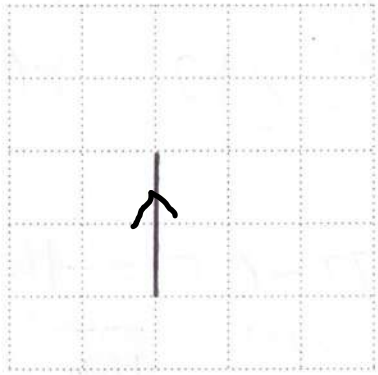
(i) $2\mathbf{a}$,

(ii) $\mathbf{a} + \mathbf{b}$.

$\begin{bmatrix} 4 \\ 2 \end{bmatrix}$



$\begin{bmatrix} 0 \\ 2 \end{bmatrix}$ ✓✓



[2]

(b) Emma says that if she draws vector **a** and vector **b** they will be the same.

Explain why this is incorrect.

Different direction ✓

..... [1]

(c) $\mathbf{c} = \begin{pmatrix} -12 \\ 0 \end{pmatrix}$.

Find the value k so that $k(\mathbf{a} - \mathbf{b}) = \mathbf{c}$.

$K\left[\begin{bmatrix} 2 \\ 1 \end{bmatrix} - \begin{bmatrix} -2 \\ 1 \end{bmatrix}\right] = \begin{bmatrix} -12 \\ 0 \end{bmatrix}$ m ✓

$K\begin{bmatrix} 4 \\ 0 \end{bmatrix} = \begin{bmatrix} -12 \\ 0 \end{bmatrix}$

(c) $k =$ -3 ✓ [2]

© OCR 2017

12 Helen delivers parcels.
On Tuesday, Helen delivered 20% more parcels than on Monday.
On Wednesday, Helen delivered 50% fewer parcels than on Tuesday.
On Wednesday, Helen delivered 72 parcels.

Calculate the number of parcels that Helen delivered on Monday.

M T W
? x 1·2 x 0·5 = 72

72 ÷ 0·5 = 144 ✓✓

144 ÷ 1·2 ✓✓ = 120 ✓

..... [5]

13 **(a)** Write $\frac{7}{9}$ as a recurring decimal.

$$9\overline{)7.00}\quad 0.7$$

$0.\dot{7}$ ✓

(a) ..... [1]

(b) Sally divided a two-digit number by another two-digit number.
Her answer was 3.18181818..... .

Find two numbers that Sally could have used.

$x = 0.\dot{1}\dot{8}$

$100x = 18.\dot{1}\dot{8}$

$99x = 18$

$x = \frac{18}{99} = \frac{2}{11}$ ✓

$11 \times 3 + 2 = 35$

(b) 35 ..... and 11 ..... [3] ✓✓

or 70 22

© OCR 2017

14 John has

- 8 different shirts
- 6 different hats
- 4 different scarves.

(a) On Monday, he picks a shirt, a hat and a scarf.

Show that there are 192 different combinations he can pick.

$8 \times 6 \times 4 = 192$ ✓

..... [1]

(b) John thinks that if he picks **just two** of the three items of clothing there will be more than 192 combinations.

Is he correct?
Show your reasoning.

$(8 \times 6) + (8 \times 4) + (6 \times 4)$ ✓✓

$= 48 + 32 + 24$

$= 104$ so No ✓

.....

..... [3]

15 **(a)** Simplify fully.

(i) $\sqrt{50} + \sqrt{2}$

$= \sqrt{25}\sqrt{2} + \sqrt{2}$ ✓

$= 5\sqrt{2} + \sqrt{2}$

$= 6\sqrt{2}$ ✓

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

(ii) $\frac{10}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}}$ ✓

$= \frac{10\sqrt{6}}{6}$

$\frac{5\sqrt{6}}{3}$ ✓

(ii) ..... [2]

© OCR 2017

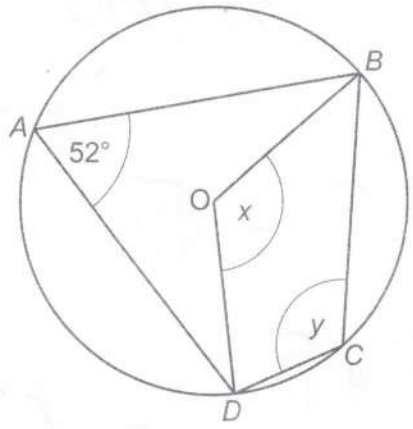
(b) There are two errors in Sam's method for finding the value of $64^{-\frac{2}{3}}$ shown below.

Find the cube root of 64 and then multiply by 2.
The cube root of 64 is 4 and then 4 x 2 = 8.
The negative power makes the answer negative so answer equals -8.

Describe these errors and then give the correct value of $64^{-\frac{2}{3}}$.

Should square, not x2 ✓
Negative power means reciprocal ✓
Correct value $\frac{1}{16}$ ✓ [3]

16 A, B, C and D are points on the circumference of a circle, centre O.



Not to scale

Angle BAD = 52°.

(a) Work out angle *x*.
Give a reason for your answer.

$x =$ 104 ✓ ° reason angle at centre is twice angle at circumference ✓ [2]

(b) Work out angle *y*.
Give a reason for your answer.

$y =$ 128 ✓ ° reason opposite angles in a cyclic quadrilateral sum to 180 ✓ [2]

OE

© OCR 2017

17 **(a)** Simplify.

$$\frac{x^2-16}{x^2-3x-4}$$

$$\frac{(x+4)(x-4)}{(x-4)(x+1)}$$

$$\frac{x+4}{x+1}$$

(a) ..... **[4]**

(b) $(x+3)(x-4)(x+5)$ is identical to $x^3+ax^2-17x+b$.

Find the value of a and the value of b.

$x^2-4x+3x-12$

x^2-x-12

x	x^3	$-x^2$	$-12x$
5	$5x^2$	$-5x$	-60

$= x^3+4x^2-17x-60$

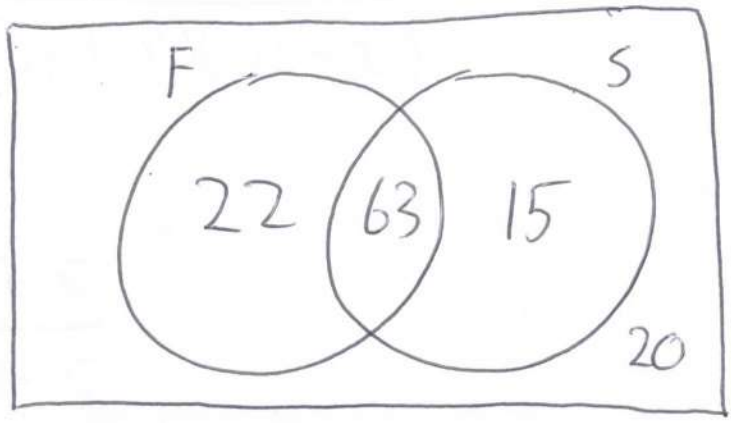
(b) $a =$ 4 .....

$b =$ -60 ..... **[2]**

© OCR 2017

18 In a group of 120 adults, 85 watch football, 78 play a sport and 20 do neither.

Find the probability that an adult chosen at random from those who watch football does not play a sport.



✓✓

85
+78
163

163 − (120 − 20)
= 63 ✓

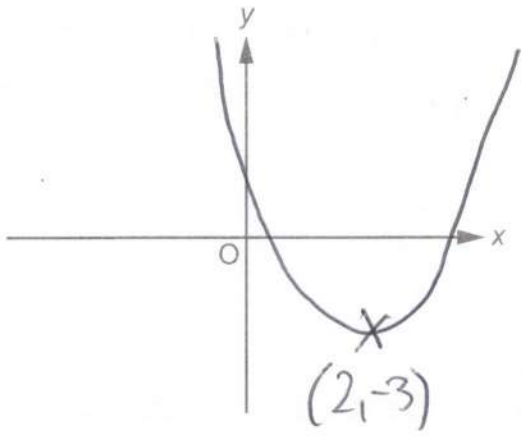
$\frac{22}{85}$ ✓ ✓OE

..... [5]

© OCR 2017

V(2,-3)

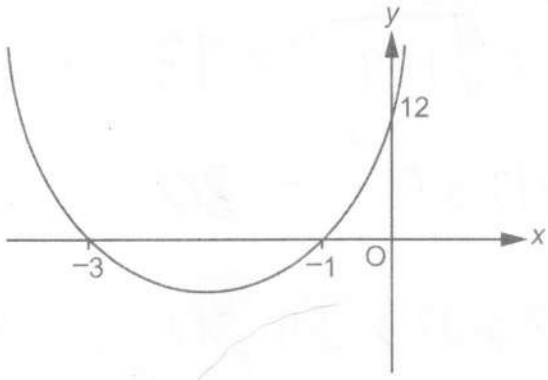
19 **(a)** Sketch the graph of $y = (x-2)^2 - 3$.
Show the coordinates of any turning points.



✓ ✓ ✓

[3]

(b) The sketch shows part of a graph which has equation $y = ax^2 + bx + c$.



Not to scale

Find the values of a, b and c.

$y = k(x+3)(x+1)$ ✓

$= k(x^2 + 4x + 3)$ ✓

$3k = 12$

$k = 4$ ✓

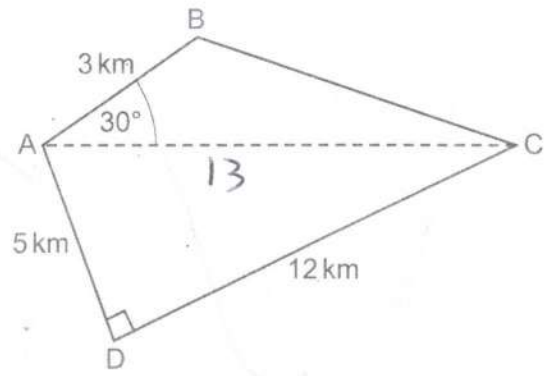
(b) $a =$ 4 ✓

$b =$ 16 ✓

$c =$ 12 **[5]**

© OCR 2017

20 The diagram shows some land in the shape of a quadrilateral, ABCD.



Not to scale

AB = 3 km, AD = 5 km, CD = 12 km and angle BAC = 30°.

The land is sold for £10 million per square kilometre.

Calculate the total cost of the land.

$AC = \sqrt{5^2+12^2} = \sqrt{169} = 13$ ✓✓

Area $ACD = \frac{1}{2} \times 12 \times 5 = 30$ ✓

Area $ABC = \frac{1}{2} \times 3 \times 13 \times \sin 30$ ✓

$= \frac{1}{2} \times 39 \times \frac{1}{2} = \frac{39}{4} = 9.75$ ✓

Cost = 39.75 × 10 million

✓

£ 397.5 ✓ million **[7]**

© OCR 2017

21 n is an integer.

(a) Explain why $2n + 1$ is an odd number.

2n is even

even +1 = odd ✓

[1]

(b) Prove that the difference between the squares of two **consecutive** odd numbers is a multiple of 8.

$(2n+3)^2 - (2n+1)^2$ ✓✓

$4n^2 + 9 + 12n - 4n^2 - 1 - 4n$ ✓✓

$= 8n + 8$

$= 8(n+1)$ ✓

[5]

END OF QUESTION PAPER

OCR
Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© OCR 2017