Cambridge Assessment International Education

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3591527429

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **October/November 2020**

2 hours 15 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π, use your calculator value.

INFORMATION

- The total mark for this paper is 120.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Blank pages are indicated.

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Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

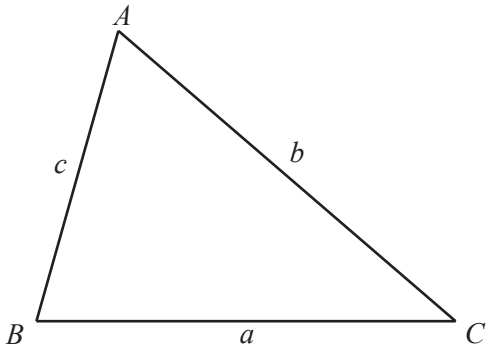
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \frac{1}{3}Ah$

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $\quad V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$



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

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

$$\text{Area} = \frac{1}{2}bc\sin A$$

Answer **all** the questions.

1 Asif buys a one-year old car.
He pays $19 975 which is 15% less than its price when it was new.

(a) Calculate the price when it was new.

$ ..... [2]

(b) Option 1 Pay 10% of the $19 975 and then pay $345 per month for 5 years.

Option 2 Borrow $19 975 and pay this back at the end of 5 years at a rate of 2.5% per year compound interest.

Asif can pay for the car using Option 1 or Option 2.

(i) Using Option 1, find how much Asif would pay in total for the car.

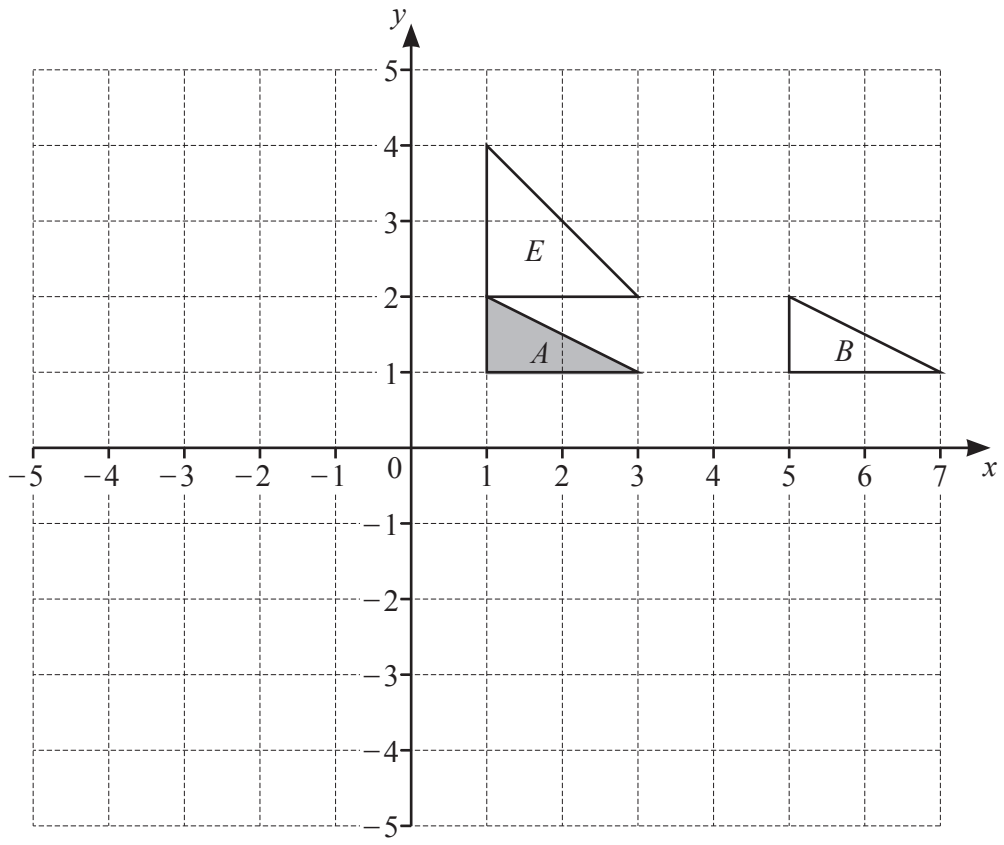
$ ..... [3]

(ii) By how much is Option 2 cheaper than Option 1?

$ ..... [4]

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2



(a) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [2]

(b) Reflect triangle A in the line $y = -x$. Label the image C. [2]

(c) Rotate triangle A through 90° clockwise about centre $(1, -1)$. Label the image D. [2]

(d) Describe fully the **single** transformation that maps triangle C onto triangle D.

.....

..... [2]

(e) Describe fully the **single** transformation that maps triangle A onto triangle E.

.....

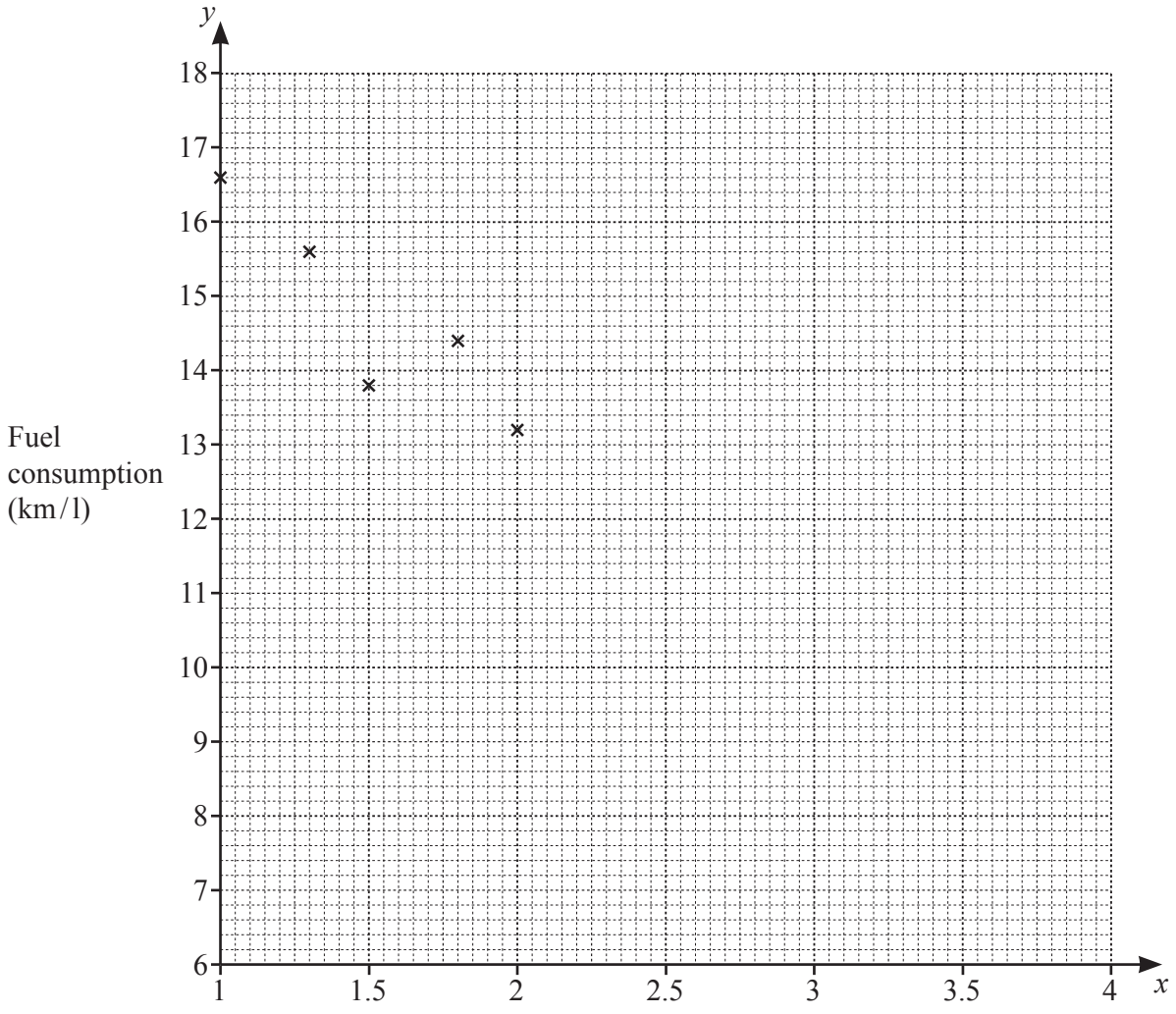
..... [3]

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3 The table shows the engine capacity, x litres, and the fuel consumption, y kilometres per litre, for each of nine cars.

Engine capacity (x litres)	1	1.3	1.5	1.8	2	2.5	3	3.5	4
Fuel consumption (y km/l)	16.6	15.6	13.8	14.4	13.2	11.0	11.5	9.2	7.4

(a) Complete the scatter diagram. The first five points have been plotted for you.



[2]

(b) What type of correlation is shown in your scatter diagram?

..... [1]

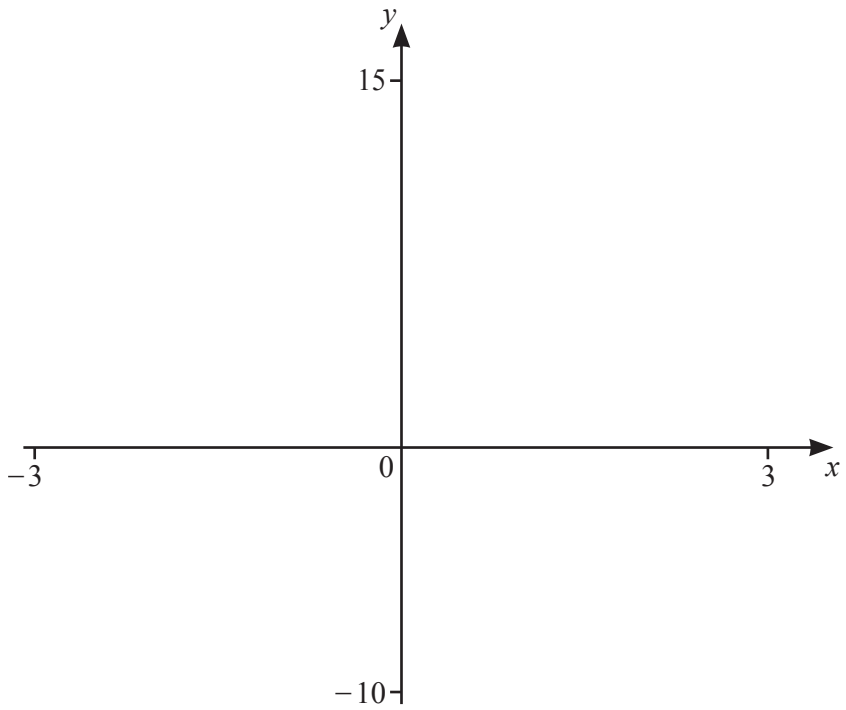
(c) Find the equation of the regression line for y in terms of x.

$y =$ ..... [2]

(d) Use your answer to **part (c)** to estimate the fuel consumption for a car with engine capacity 2.8 litres.

..... km/l [1]

4



$f(x) = x^3 - 5x + 3$ for $-3 \leqslant x \leqslant 3$

(a) On the diagram, sketch the graph of $y = f(x)$. [2]

(b) Find the coordinates of the local minimum point.

(..... , ...) [2]

(c) Describe fully the symmetry of the diagram.

.....

..... [3]

(d) $g(x) = 2x - 1$

(i) Solve $f(x) = g(x)$ for $-3 \leqslant x \leqslant 3$.

..... , ... , ... [3]

(ii) Use your answers to **part(i)** to solve $f(x) > g(x)$.

..... [2]

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5 Naomi flies non-stop from London, England, to Perth, Australia.
The flight takes 16 hours 45 minutes.
The distance is 14 498 km.

(a) Find the average speed of the plane in km/h.

..... km/h [2]

(b) The plane leaves London at 13 15.
The time in Perth is 8 hours ahead of the time in London.

Find the time in Perth when the plane lands.

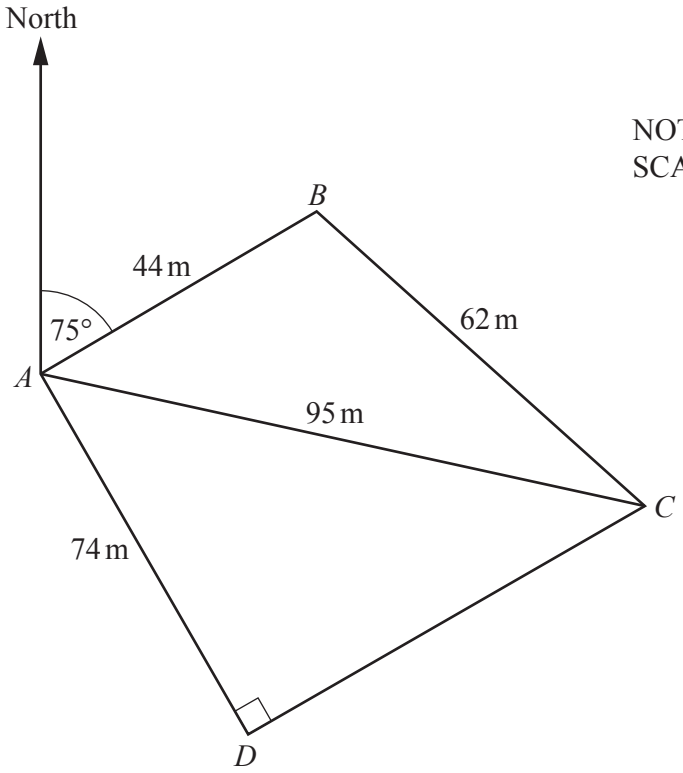
..... [3]

(c) The cost, in pounds (£), of the flight is £827.75 .
The exchange rate is 1 Australian dollar = £0.55 .

Calculate the cost of the flight in Australian dollars.

..... Australian dollars [2]

6



The diagram shows a field $ABCD$ with a straight path from A to C.
The bearing of B from A is 075° and angle $ADC = 90°$.

(a) Show that angle $BAC = 31.6°$, correct to 1 decimal place.

[3]

(b) Find the bearing of D from A.

..... [3]

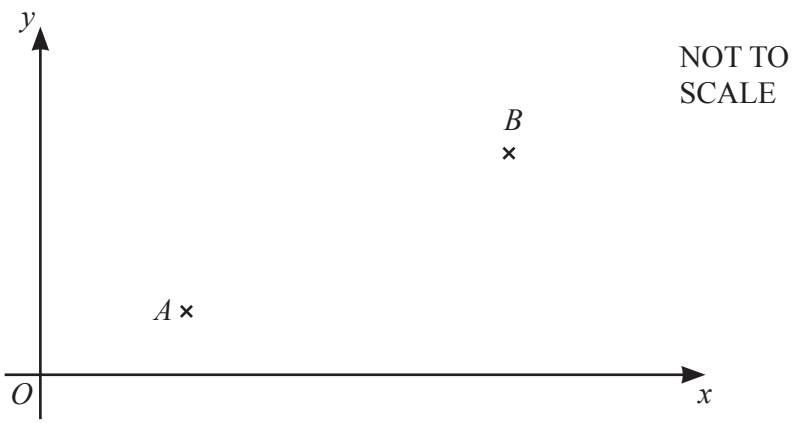
(c) Find the shortest distance from B to AC.

..... m [2]

(d) Find the total area of the field $ABCD$.

..... m^2 [3]

7



A is the point (3, 2) and B is the point (9, 5).

(a) Find the length AB.

$AB =$ ..... [3]

(b) Find the equation of the line AB.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

(c) C is the point (8, 2).

Find the equation of the line perpendicular to AB which passes through C.
Give your answer in the form $y = mx + c$.

$y =$ ..... [3]

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(d) Find the coordinates of the point where the line in **part (c)** intersects AB.

(..... , ...) [2]

(e) D is the reflection of C in the line AB.

(i) Find the coordinates of D.

(..... , ...) [2]

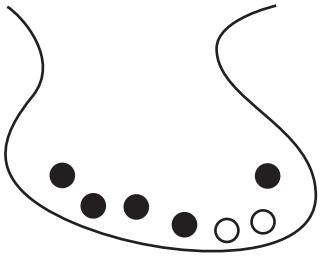
(ii) What is the special name of quadrilateral $ACBD$?

..... [1]

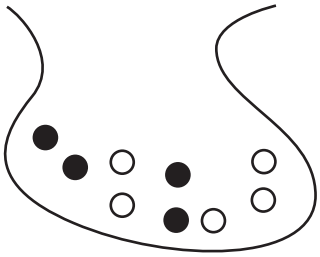
(f) Find the area of the quadrilateral $ACBD$.

..... [3]

8



Bag *A*



Bag *B*

Bag *A* contains 5 black balls and 2 white balls.
Bag *B* contains 4 black balls and 5 white balls.

(a) Gustav picks one ball at random from bag *A* and replaces it.

Write down the probability that the ball Gustav picks is black.

..... [1]

(b) Sharia picks one ball at random from bag *A*, notes its colour, and places it in bag *B*.
She then picks a ball at random from bag *B*.

Find the probability that

(i) both balls are white,

..... [2]

(ii) one ball is black and the other ball is white.

..... [3]

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(c) The balls are returned to their original bags.

Jean picks a ball at random from **bag *A***.
He then replaces the ball.
He continues to do this until he gets a white ball.

Find the probability that the first time he gets a white ball is on the 5th pick.

..... [2]

(d) The balls are returned to their original bags.

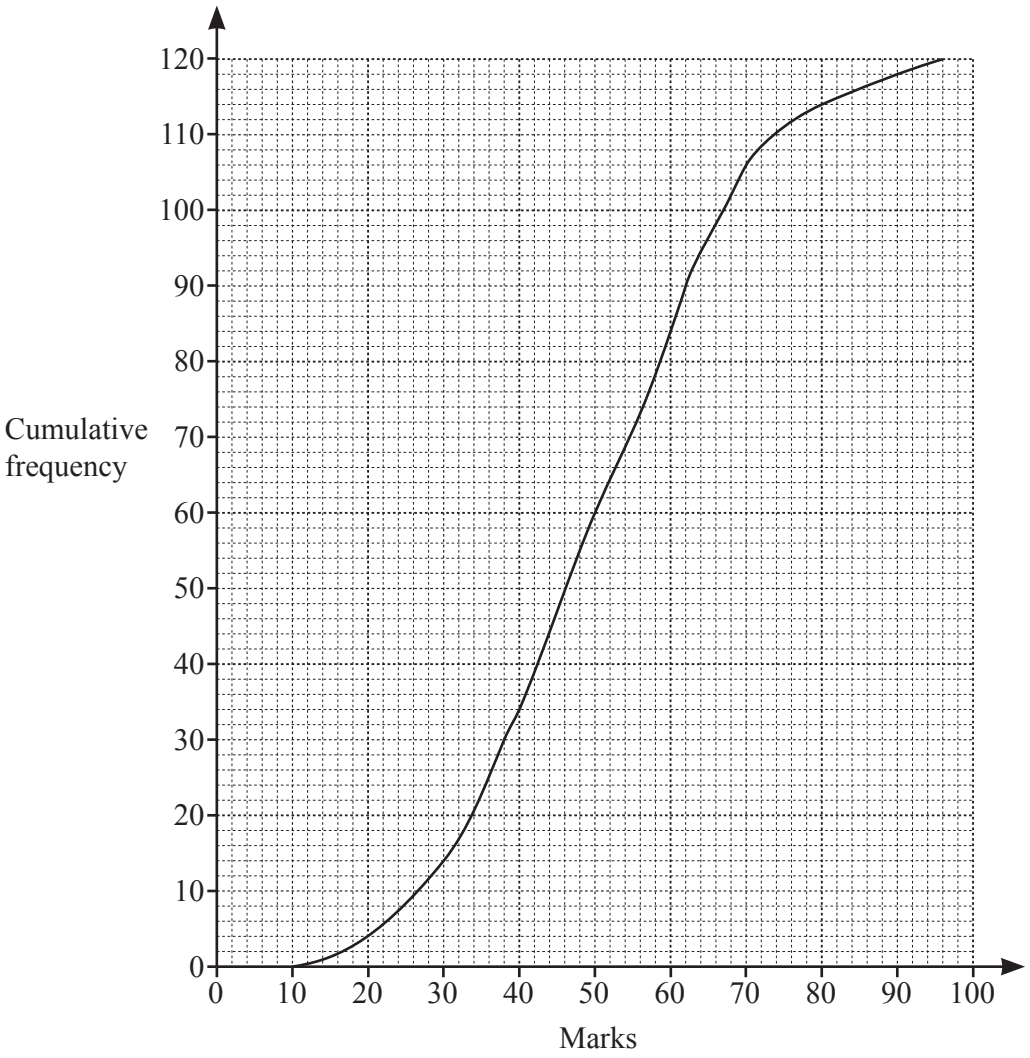
Leanne picks a ball at random from **bag *B***.
She continues to do this without replacement until she gets a white ball.

The probability that she picks the first white ball on her nth attempt is $\frac{5}{126}$.

Find the value of n.

..... [3]

9 The cumulative frequency curve shows the marks of 120 students in an examination.



(a) Use the graph to estimate

(i) the median,

..... [1]

(ii) the interquartile range.

..... [2]

(b) The top 15% of the students gained a grade A in the examination.

Estimate the minimum mark for a grade A.

..... [3]

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10 y is inversely proportional to the square root of x.
When $x = 25$, $y = 4$.

(a) Find y in terms of x.

$y =$ ..... [2]

(b) Find y when $x = 0.25$.

$y =$ ..... [1]

(c) Find x when $y = 5$.

$x =$ ..... [2]

(d) z is proportional to $y + 2$.
When $x = 4$, $z = 84$.

Find z in terms of x.

$z =$ ..... [3]

11 $f(x) = 5 - 3x$ $g(x) = 2x + 7$

(a) Solve $f(x) = g(x)$.

..... [2]

(b) Find and simplify $g(f(x))$.

..... [2]

(c) **(i)** Find $f(x^2) + g(x^2)$ simplifying your answer.

..... [2]

(ii) Find $(f(x) + g(x))^2$ giving your answer in the form $ax^2 + bx + c$.

..... [3]

(d) Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

(e) Write as a single fraction in its simplest form.

$$\frac{2}{f(x)} - \frac{3}{g(x)}$$

..... [3]

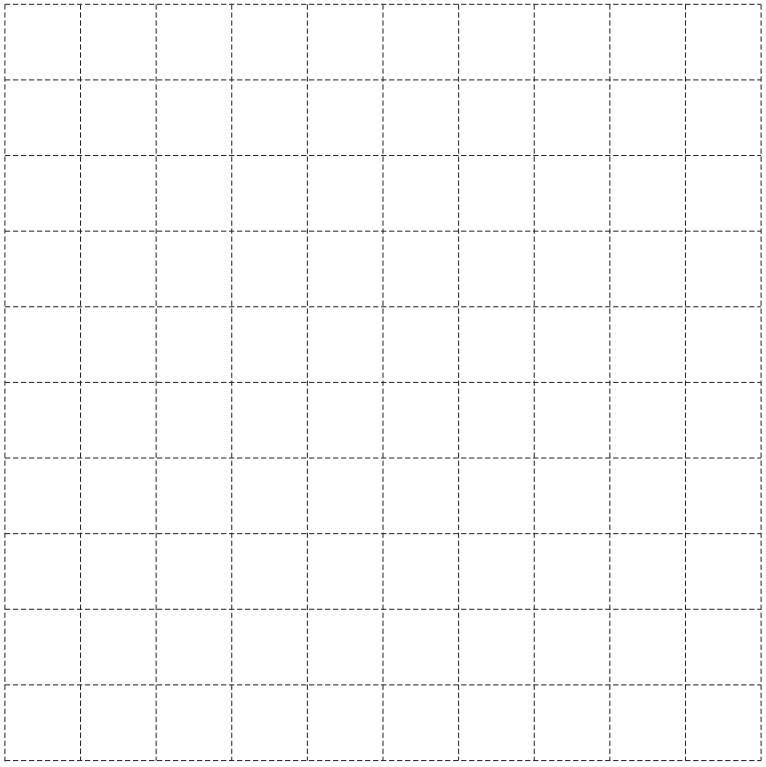
12 **(a)** The vector $\mathbf{a} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and the vector $\mathbf{b} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$.

On the grid, draw and label these vectors.

(i) $2\mathbf{a}$ [1]

(ii) $-\mathbf{b}$ [1]

(iii) $\mathbf{a} - 2\mathbf{b}$ [2]



(b) $p\begin{pmatrix}2\\3\end{pmatrix}+q\begin{pmatrix}-1\\4\end{pmatrix}=\begin{pmatrix}10\\-7\end{pmatrix}$

By solving a pair of simultaneous equations, find the value of p and the value of q.
Show all your working.

$p =$ .....

$q =$ ..... [4]

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