Cambridge IGCSE™

CANDIDATE NAME	

CENTRE NUMBER							CANDIDATE NUMBER				

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.

2

Formula List

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

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

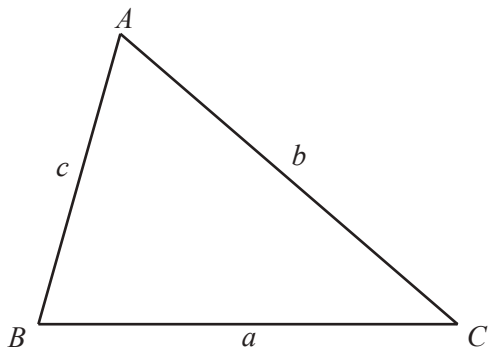Curved surface area, A, of cone of radius r, sloping edge l. $\qquad A = \pi rl$

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

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

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

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

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

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

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

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

3

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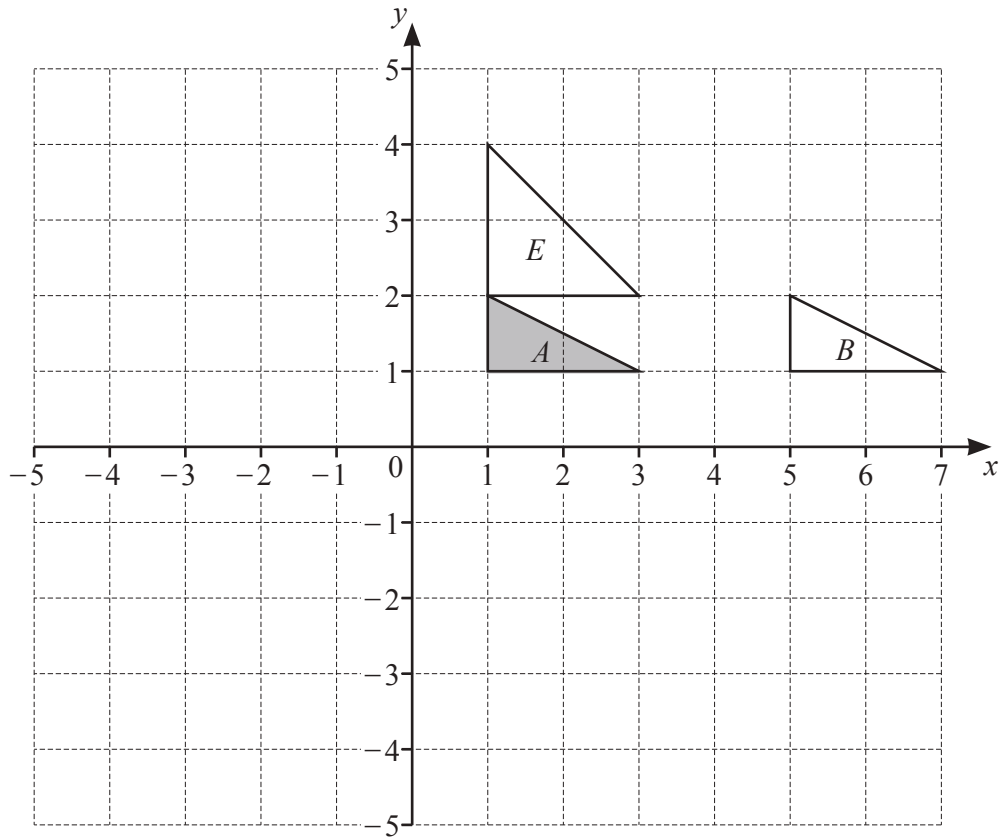
    Asif can pay for the car using Option 1 or Option 2.

    (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]

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]

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.

Engine capacity (litres) [2]
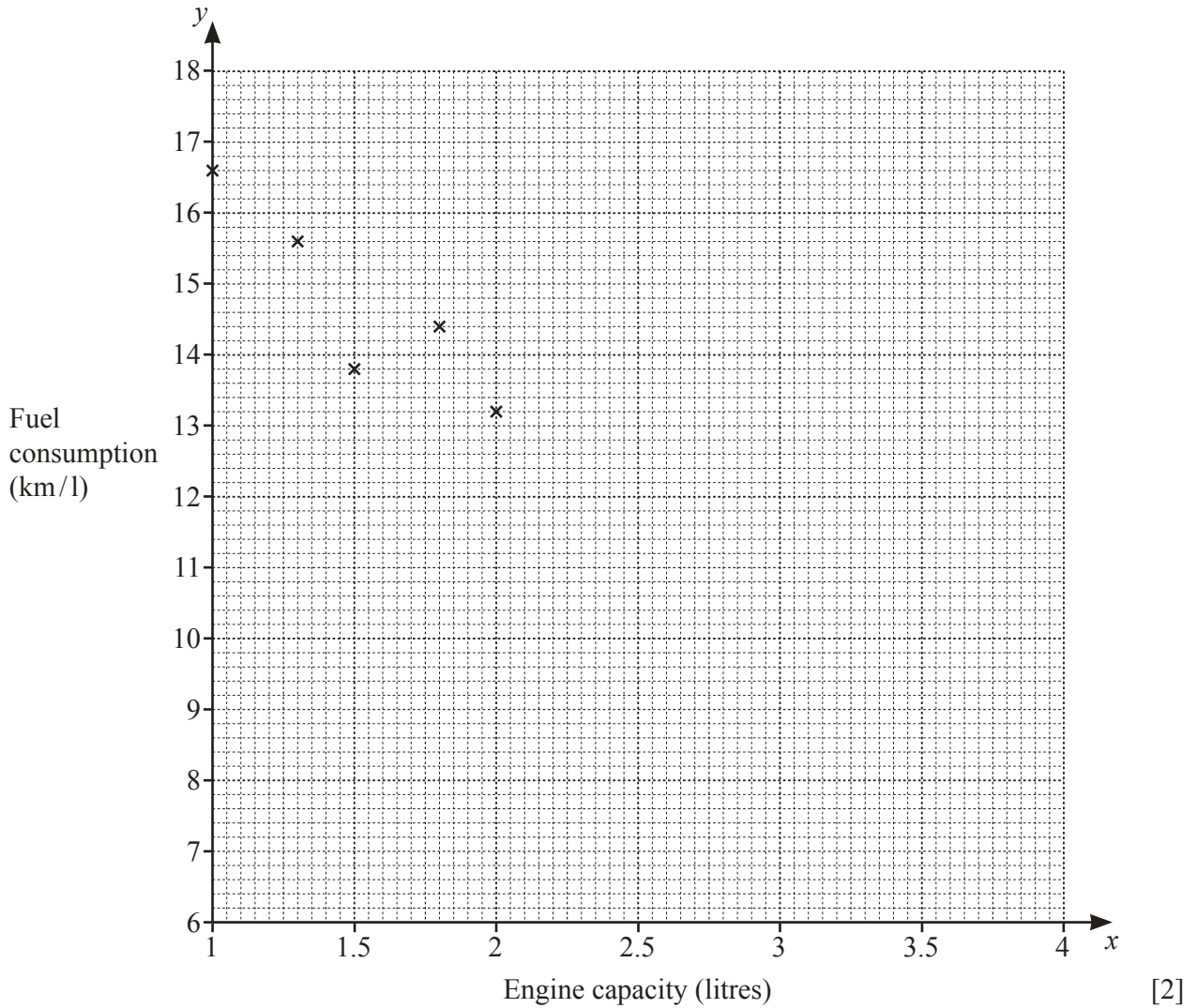
(b) What type of correlation is shown in your scatter diagram?

.... [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
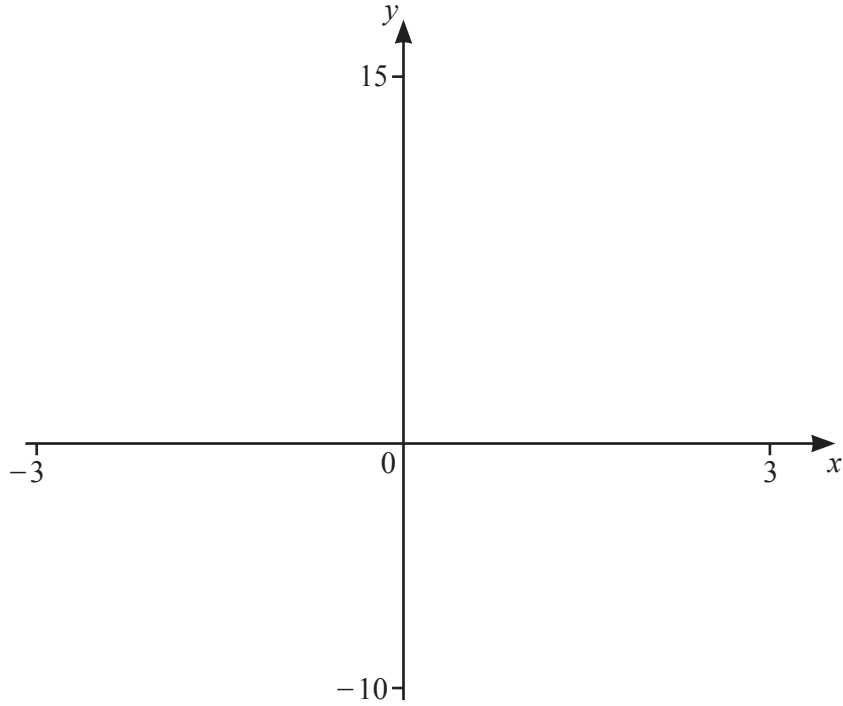
$$f(x) = x^3 - 5x + 3 \quad \text{for } -3 \leqslant x \leqslant 3$$

(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]

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.
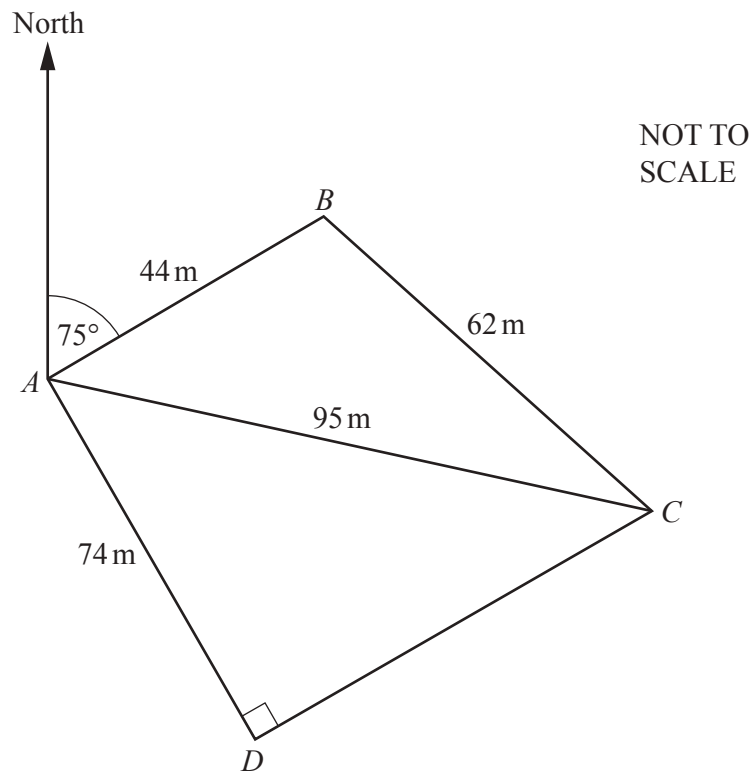
.... [3]

(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

North

NOT TO
SCALE

B

44 m

75°

A

62 m

95 m

74 m

C

D

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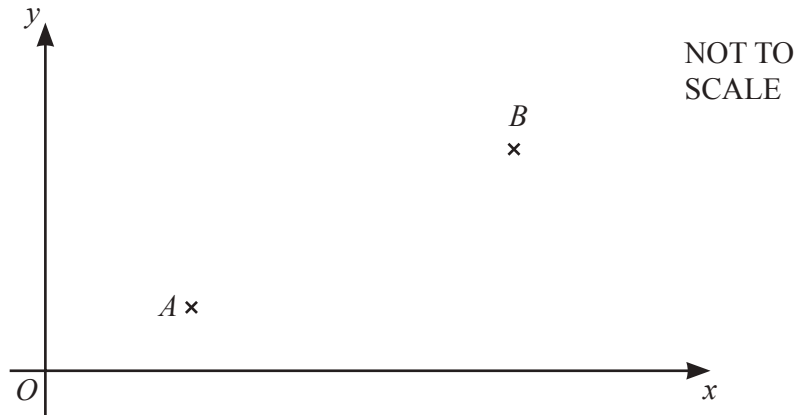
A is the point (3, 2) and B is the point (9, 5).

(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]

(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
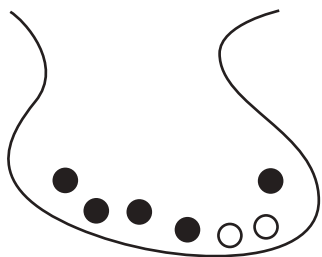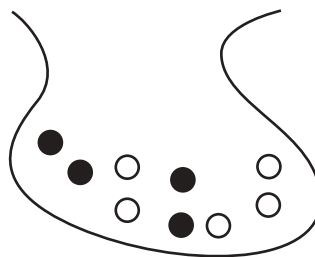
Bag *A*   Bag *B*

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]

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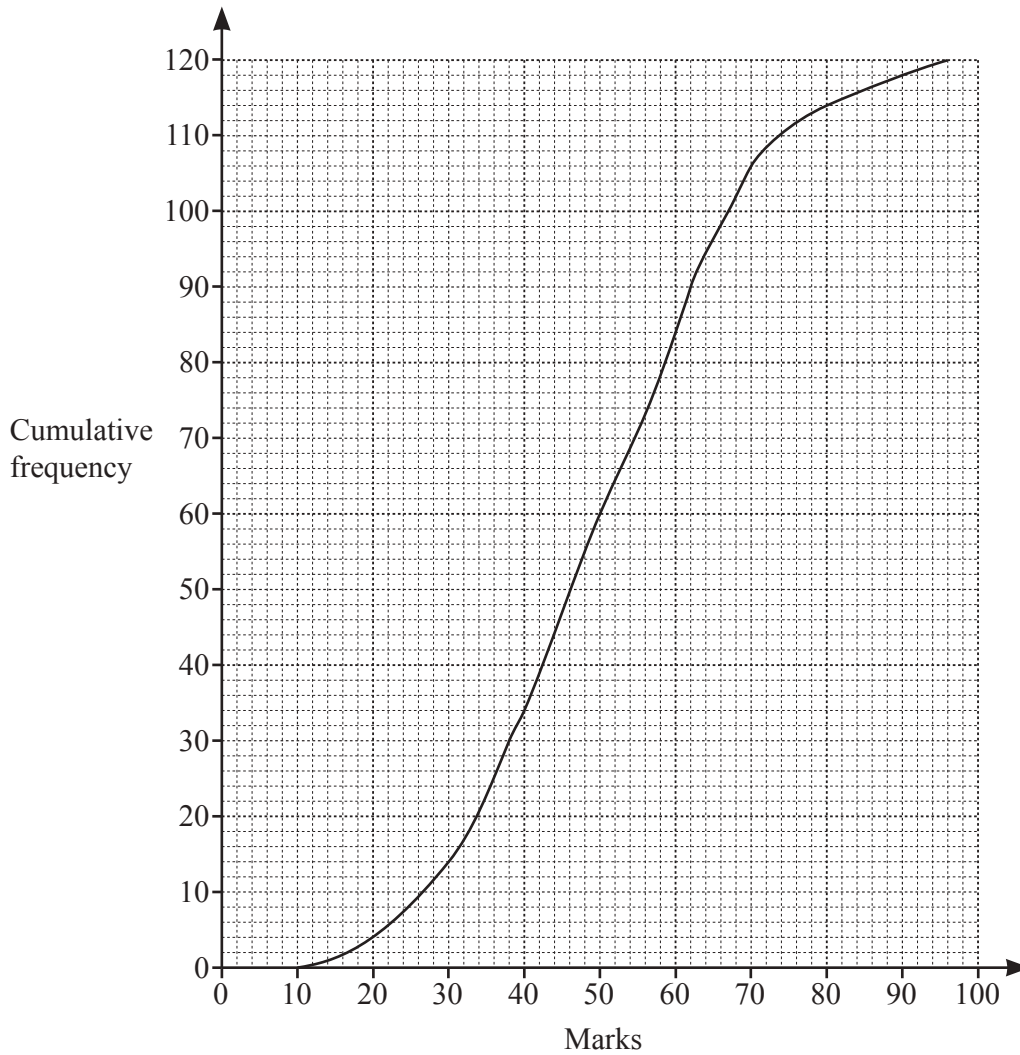
Leanne picks a ball at random from **bag** *B*.
She continues to do this without replacement until she gets a white ball.

The probability that she picks the first white ball on her *n*th 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]

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

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

(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.

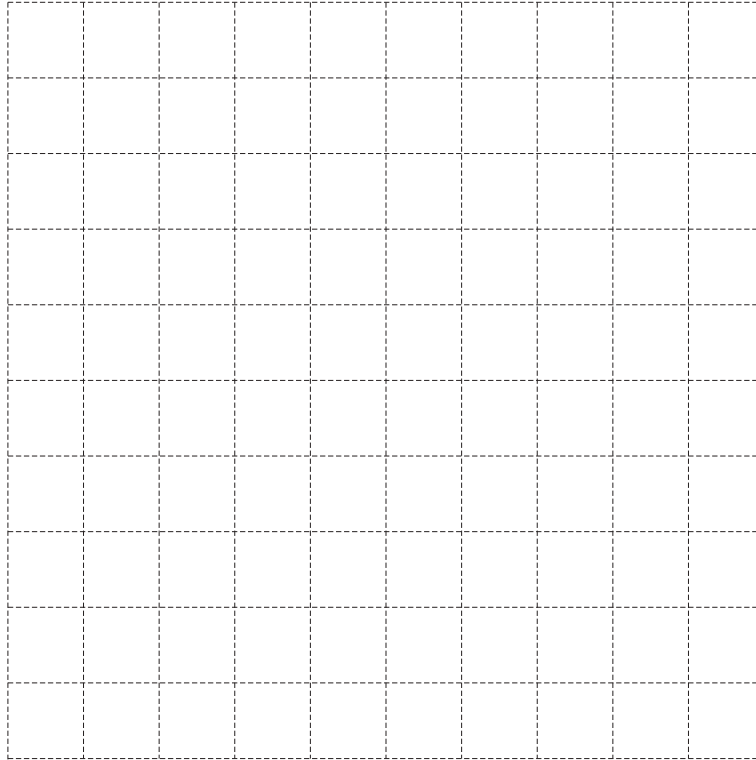   **(i)** $2\mathbf{a}$ [1]

    (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]