Cambridge O Level

Cambridge International Examinations
Cambridge Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS (SYLLABUS D) **4024/12**

Paper 1 **October/November 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

If working is needed for any question it must be shown in the space below that question.
Omission of essential working will result in loss of marks.

ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 80.

This document consists of **20** printed pages.

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ELECTRONIC CALCULATORS MUST NOT BE USED IN THIS PAPER

1 **(a)** Evaluate $\frac{1}{8} + \frac{2}{5}$.

Answer ..... [1]

(b) Evaluate 0.04×0.11 .

Answer ..... [1]

2 **(a)** 200 grams of a spice cost 85 cents.

Find the cost, in dollars, of 1 kilogram of this spice.

Answer $ ..... [1]

(b) You are given that $60 : x = 3 : 2$.
Find x.

Answer $x =$ ..... [1]

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3 y is inversely proportional to x.

Given that $y = 30$ when $x = \frac{1}{3}$, find y when $x = 5$.

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

4 Arrange these fractions in order, starting with the smallest.

$$\frac{4}{5} \qquad \frac{9}{10} \qquad \frac{17}{20} \qquad \frac{21}{25} \qquad \frac{41}{50}$$

Show your working.

Answer ..... , ... , ... , ... , ... [2]
smallest

5 **(a)** Simplify $4c - 3(2c - 5)$.

Answer ..... [1]

(b) Factorise $8 - 10y + 12x - 15xy$.

Answer ..... [2]

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6 $$f(x) = \frac{2x+5}{3x}$$

(a) Find $f(-2)$.

Answer ..... [1]

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

Answer $f^{-1}(x) =$ ..... [3]

7 In a group of 35 people,

22 are wearing spectacles,
10 are wearing a hat,
6 are wearing spectacles and a hat.

By drawing a Venn diagram, or otherwise, find the number of people who are wearing neither spectacles nor a hat.

Answer ..... [2]

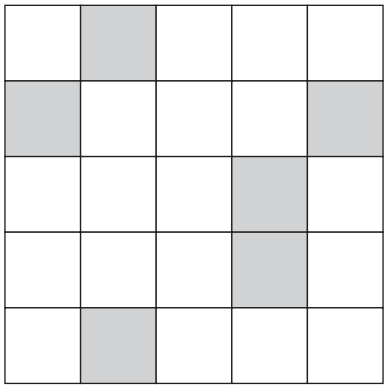
8 **(a)** The diagram shows **part** of a figure that has rotational symmetry of order 4 about the point O.

Complete the figure.

[1]

(b) In the diagram, six small squares are shaded.

Shade **one** more small square to give a diagram that has exactly one line of symmetry.



[1]

9 $p = 8 \times 10^{-6}$ $q = 2 \times 10^{11}$

Evaluate the following, giving your answers in standard form.

(a) $p \times q$

Answer ..... [1]

(b) $p \div q$

Answer ..... [1]

(c) $\sqrt[3]{p}$

Answer ..... [1]

10 By writing each number correct to 2 significant figures, estimate the value of

$$\frac{1212.3}{299.35 \times \sqrt{24.73}}.$$

Answer ..... [2]

11 Here are the first five terms of a sequence.

$$\frac{3}{4} \quad \frac{7}{8} \quad \frac{11}{12} \quad \frac{15}{16} \quad \frac{19}{20}$$

(a) Write down the next two terms.

Answer ..... , ... [1]

(b) The kth term is $\frac{1199}{1200}$.

Find k.

Answer $k =$ ..... [1]

(c) Find an expression, in terms of n, for the nth term.

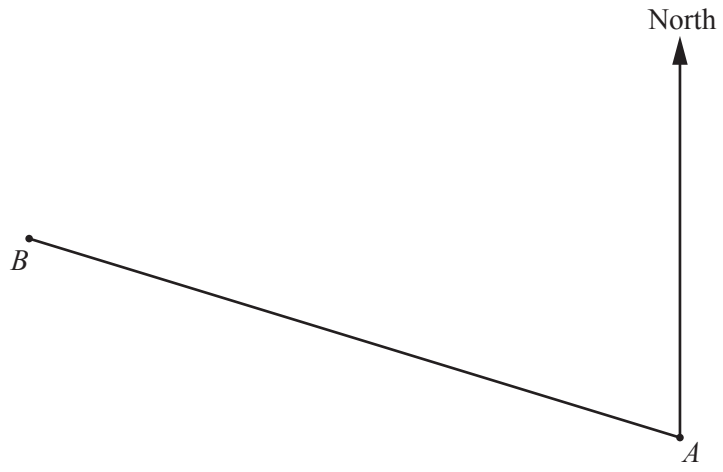
Answer ..... [2]

12 Each interior angle of a regular polygon is 175°.

Find the number of sides in the polygon.

Answer ..... [2]

13 The scale diagram shows two islands at A and B.



Scale: 2 cm to 1 km

(a) Write the scale 2 cm to 1 km in the form 1 : n.

Answer 1 : ..... [1]

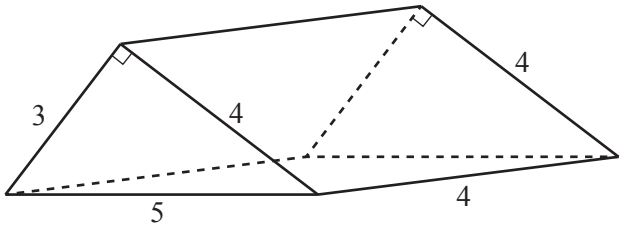
(b) By measurement, find the bearing of B from A.

Answer ..... [1]

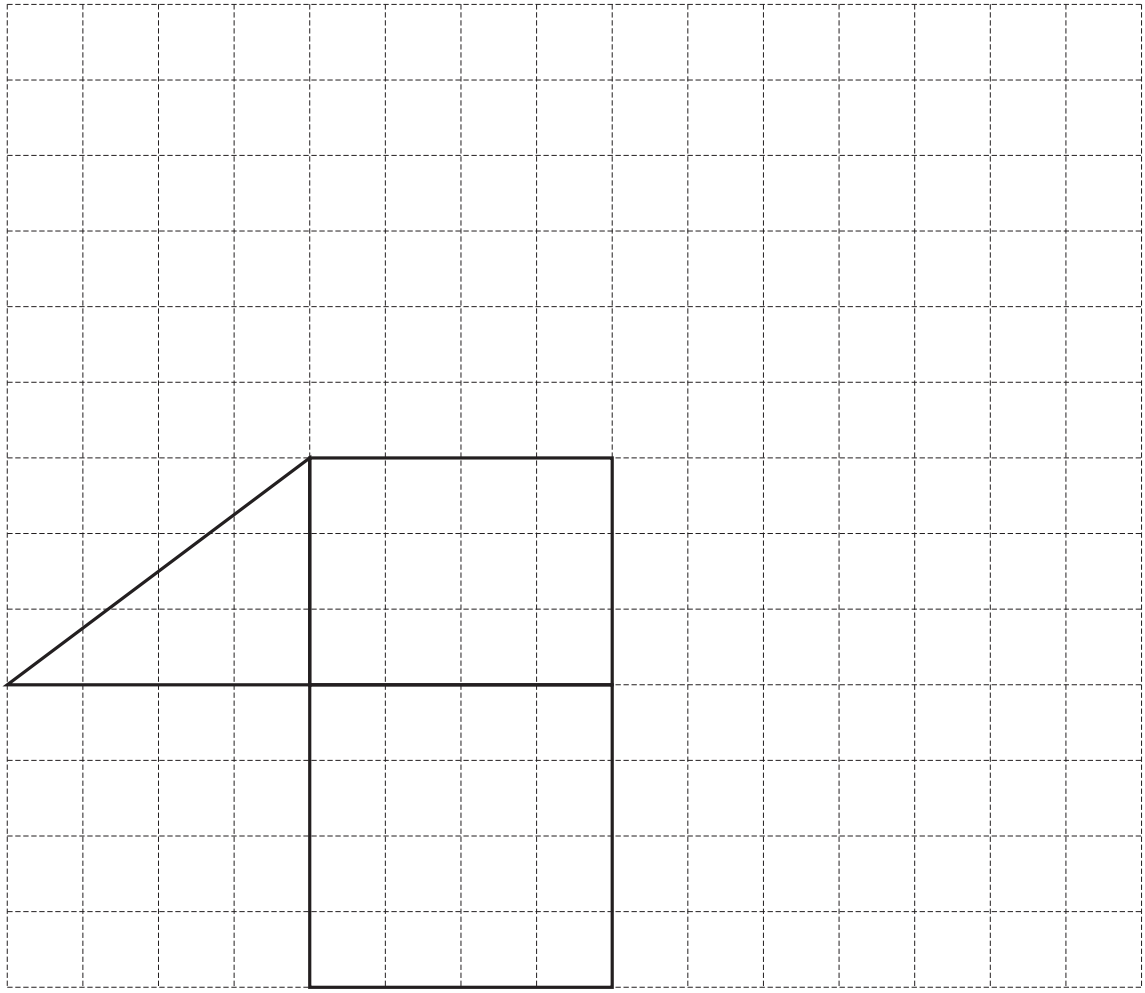
(c) An island at C is on the northern side of AB.
It is 3 km from A and 2.5 km from B.

Use a ruler and a pair of compasses to construct triangle ABC. [2]

14 The diagram shows a triangular prism.
The measurements are in centimetres.



(a) On the grid below, complete the accurate drawing of a net of the prism.
Do **not** draw outside the grid.



[2]

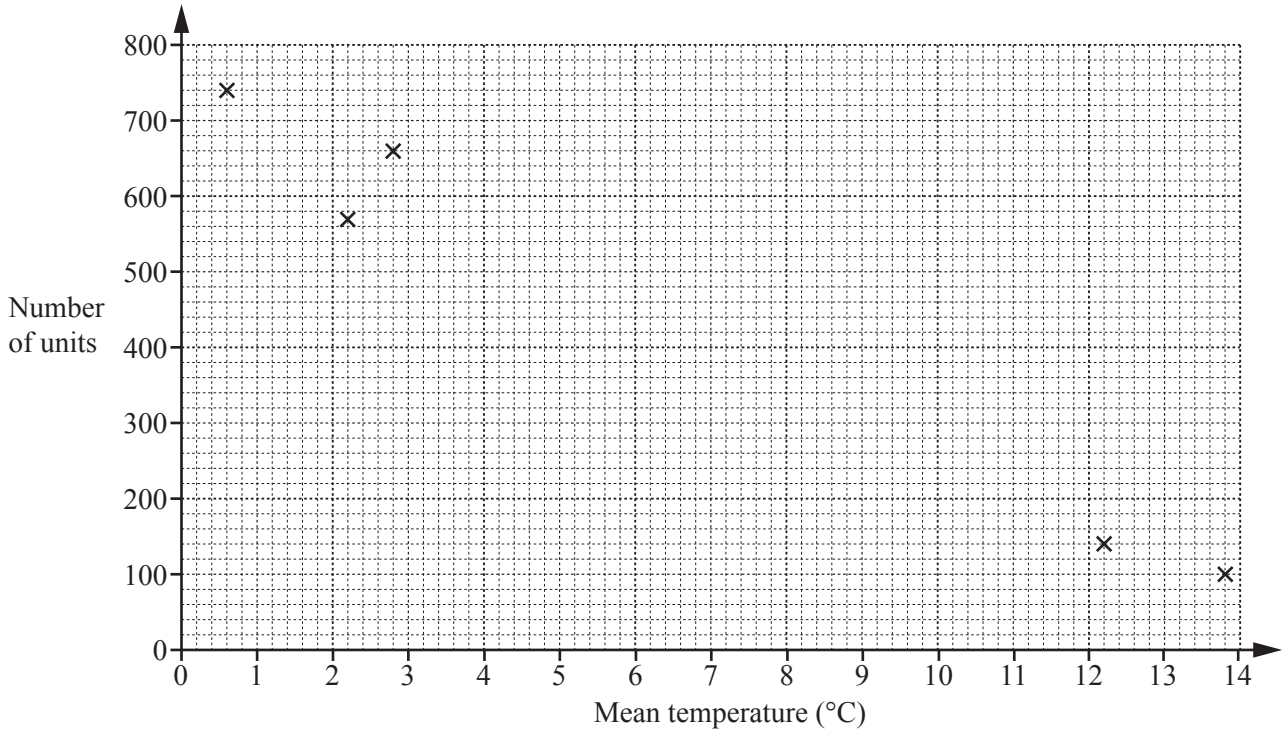
(b) Find the total surface area of the prism.

Answer ..... cm^2 [2]

15 Each week, Henri records the number of units of gas used in his house and the mean temperature outside.
Ten of his results are shown in the table.

Mean temperature (°C)	12.2	13.8	0.6	2.2	2.8	4.4	5.6	6.8	9.0	10.6
Number of units	140	100	740	570	660	600	500	560	410	320

(a) On the grid, complete the scatter diagram.
The first five results have been plotted for you.



[2]

(b) What type of correlation does your scatter diagram show?

Answer ..... [1]

(c) Draw a line of best fit on the grid. [1]

(d) Use your line of best fit to estimate the number of units used for one week when the mean temperature outside is 7.6 °C.

Answer ..... [1]

16 Find the possible values of x, given that x is an integer and $15 < 2x - 3 < 22$.

Answer ..... [3]

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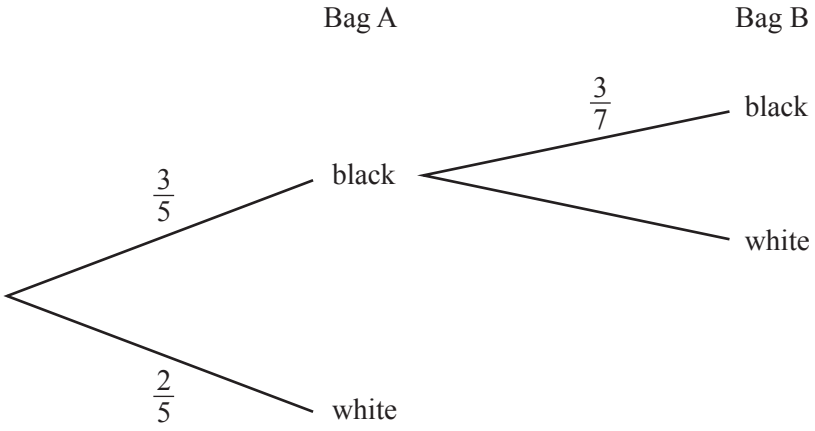
17

Bag A Bag B

Bag A contains 3 black and 2 white beads.
Bag B contains 2 black and 4 white beads.

A bead is chosen, at random, from Bag A and placed in Bag B.
A bead is then chosen, at random, from Bag B.

(a) Complete the tree diagram.

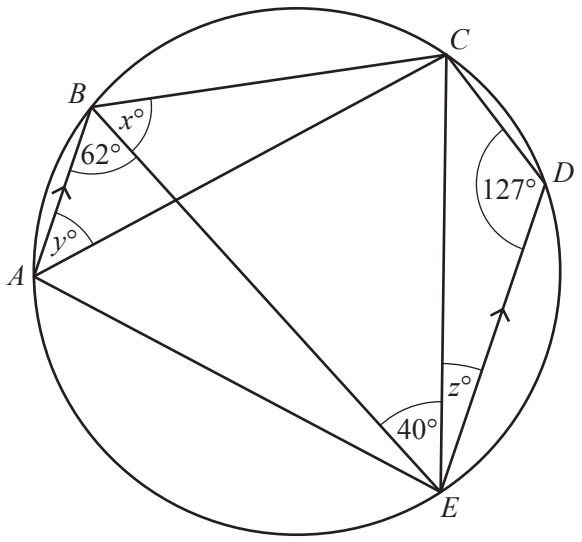


[2]

(b) Find the probability that a black bead is taken from Bag B.

Answer ..... [2]

18



In the diagram, A, B, C, D and E lie on the circle.
AB is parallel to ED.
$A\hat{B}E = 62°$, $C\hat{D}E = 127°$ and $B\hat{E}C = 40°$.

(a) Find x.

Answer $x =$ ..... [1]

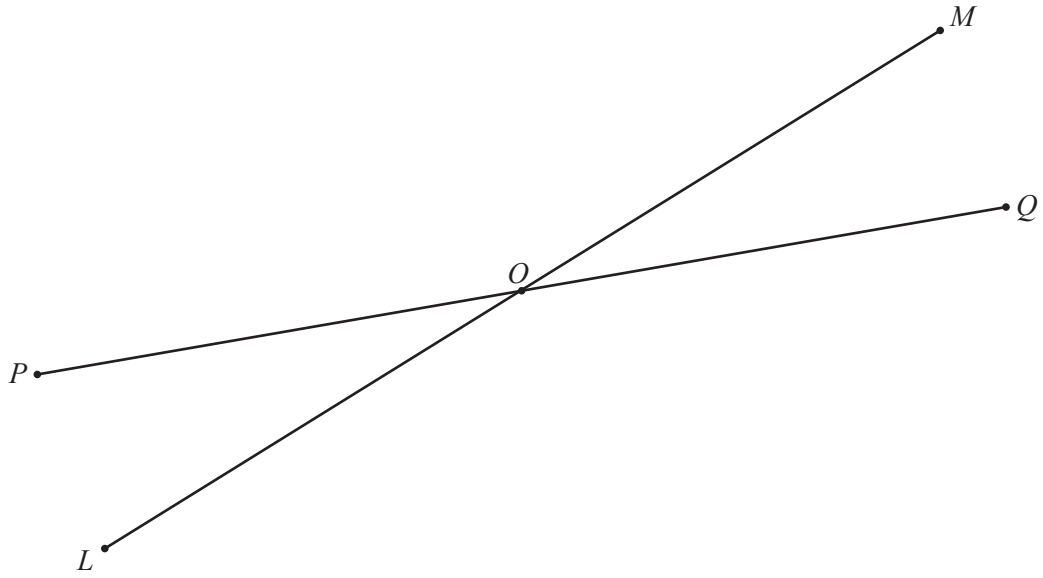
(b) Find y.

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

(c) Find z.

Answer $z =$ ..... [1]

19 In the diagram, PQ intersects LM at O.



On the diagram, construct

(a) the locus of points that are equidistant from the lines PQ and LM, [2]

(b) the locus of points that are equidistant from O and Q. [1]

20 P is the point $(-3, 4)$, Q is the point $(5, 1)$.

(a) M is the midpoint of PQ.

Find the coordinates of M.

Answer (..... , ...) [1]

(b) Find the gradient of PQ.

Answer ..... [1]

(c) R is the point $(-6, 0)$, O is the point $(0, 0)$.

Which of the points, R or P, is closer to O?
Show your working.

Answer point ..... [2]

21 **(a)** Evaluate $9^1 + 9^0$.

Answer ..... [1]

(b) Find n, where $4^n = 2^{n-1}$.

Answer $n =$ ..... [2]

22 $\mathscr{E} = \{ 0, 1, 2, 3, 4, 5, 6 \}$
$P = \{ x : x = 0, 1, 2 \}$
$Q = \{ y : y = 0, 2 \}$

(a) List the members of $P \cap Q$.

Answer ..... [1]

(b) Find $\mathrm{n}(P' \cup Q)$.

Answer ..... [1]

(c) $R = \{ z : z = 2x + y,\ x \in P,\ y \in Q \}$

List the members of R.

Answer ..... [2]

23 **(a)** Express $\begin{pmatrix}2\\1\end{pmatrix}-3\begin{pmatrix}-1\\2\end{pmatrix}+2\begin{pmatrix}0\\-2\end{pmatrix}$ as a single vector.

Answer $\begin{pmatrix}\quad\\\quad\end{pmatrix}$ [2]

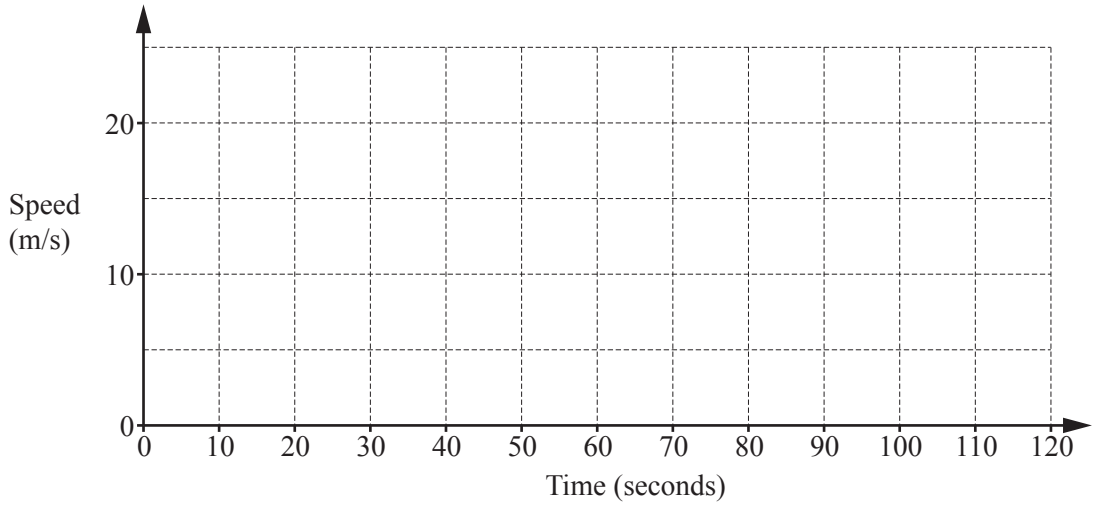
(b) Find $\begin{pmatrix}2 & -1\end{pmatrix}\begin{pmatrix}0 & -1 & 2\\3 & 1 & -3\end{pmatrix}$.

Answer [2]

24 A train travels between two stations, starting and finishing at rest.

For this journey it
- accelerates uniformly, from rest, for the first 30 seconds until it reaches a speed of 20 m/s
- travels at a constant speed of 20 m/s for the next 60 seconds
- slows down uniformly for the last 20 seconds until it stops.

(a) On the grid, draw the speed–time graph for this journey.



[2]

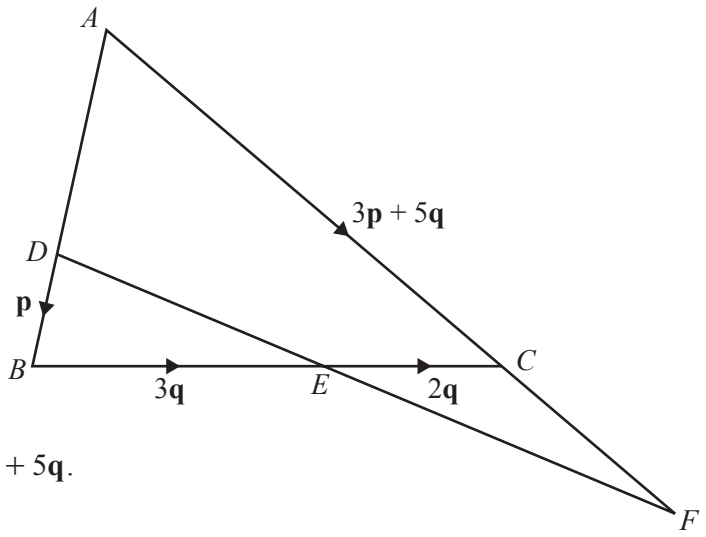
(b) Calculate the distance between the stations.

Answer ..... m [2]

Question 25 is printed on the next page

25 In the diagram, ADB and ACF are straight lines.

BC intersects DF at E.



$AC : CF = 2 : 1$.

$\overrightarrow{DB} = \mathbf{p}$, $\overrightarrow{BE} = 3\mathbf{q}$, $\overrightarrow{EC} = 2\mathbf{q}$ and $\overrightarrow{AC} = 3\mathbf{p} + 5\mathbf{q}$.

(a) Express $\overrightarrow{AB}$ in terms of $\mathbf{p}$.

Answer $\overrightarrow{AB} =$ ..... [1]

(b) Express $\overrightarrow{CF}$ in terms of $\mathbf{p}$ and/or $\mathbf{q}$.

Answer $\overrightarrow{CF} =$ ..... [1]

(c) Express $\overrightarrow{EF}$ in terms of $\mathbf{p}$ and/or $\mathbf{q}$.

Answer $\overrightarrow{EF} =$ ..... [1]

(d) $\overrightarrow{EF} = k\overrightarrow{DE}$.

Find k.

Answer $k =$ ..... [2]

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