

14 (a) Solve.

$$x^2 - x - 12 \geq 0$$

(a) [3]

(b) The region **R** is defined by these three inequalities, where k is an integer.

$$2y > x + 4$$

$$x + y \leq 5$$

$$x \geq k$$

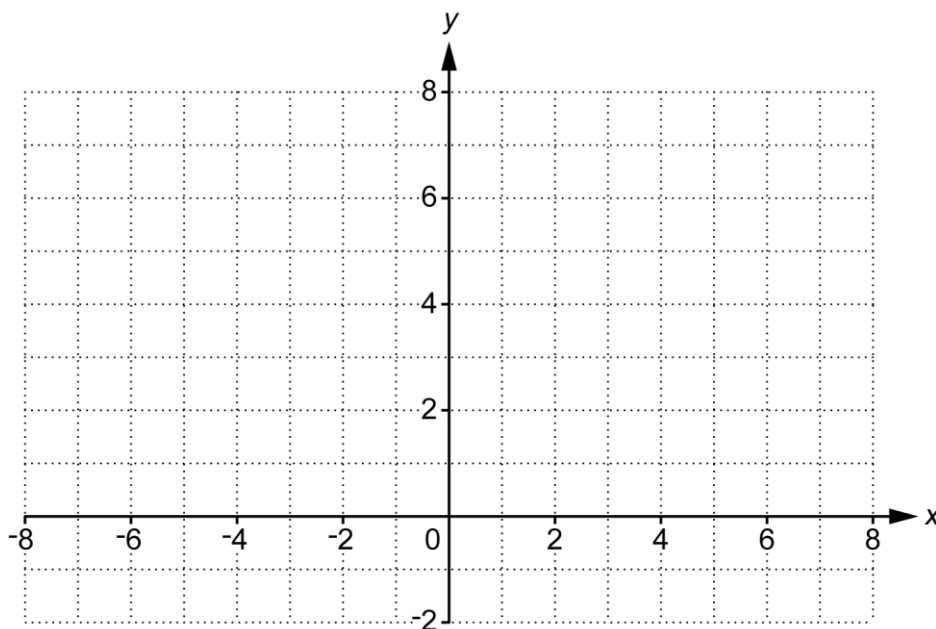
Point P has integer coordinates.

Point P lies in the region **R**.

There are 16 possible positions for point P.

Find the value of k .

Use the grid to help you.



(b) [4]

15 (a) Simplify.

$$\left(\frac{x^4 y}{x^2 y^2}\right)^3$$

(a) [2]

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

(i) $x \div \frac{y}{2}$

(b)(i) [1]

(ii) $\frac{4x}{x-2} - \frac{x}{x+3}$

(ii)..... [3]

16 y is inversely proportional to the square of x .

$$y = 9 \text{ when } x = 4.$$

(a) Find y when $x = 10$.

(a)..... [3]

(b) Calculate the percentage increase in y when x is decreased by 20%.

(b)% [3]

17 A is the point (3, 2), B is the point (7, 4) and C is the point (10, -2).

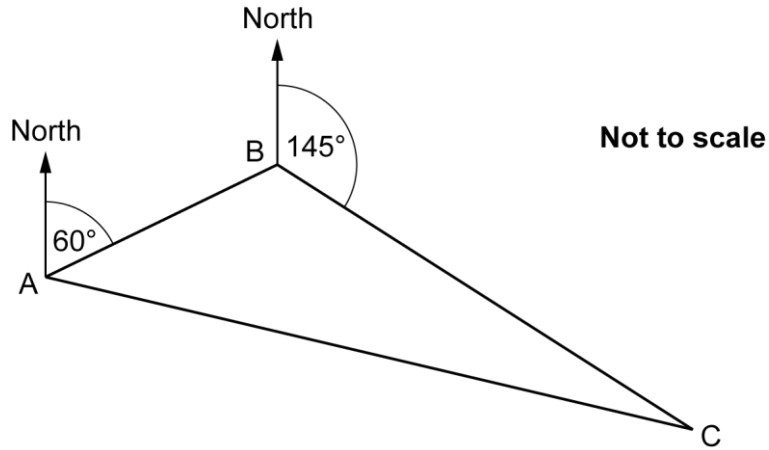
(a) Show that AB is perpendicular to BC.

[4]

(b) Calculate the length of the hypotenuse of triangle ABC.

(b) **[4]**

18 The sketch shows Jim's walking route.



B is 2.8 km from A on a bearing of 060° .
 C is 6.2 km from B on a bearing of 145° .

Jim walks at a speed of 5 km/h.

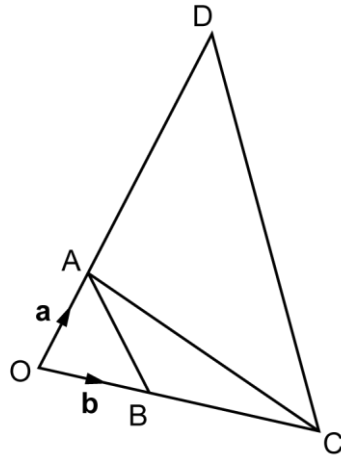
- (a) Calculate the time Jim takes to walk from A to B to C and straight back to A.
 Give your answer in hours and minutes.

(a) hours minutes [6]

- (b) State one assumption you made in part (a).
 Explain how this affected your answer.

.....
 [2]

19 In the diagram, A is a point on OD and B is a point on OC.



Not to scale

$\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$.
 $OA = \frac{1}{4} OD$ and $OB = \frac{1}{3} OC$.

(a) Find \vec{CD} .
 Give your answer in its simplest form in terms of \mathbf{a} and \mathbf{b} .

(a)..... [2]

(b) E is the point such that $\vec{AE} = 3\mathbf{b} + 2\mathbf{a}$.
 Show that ACED is a parallelogram.

.....
 [5]

END OF QUESTION PAPER

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