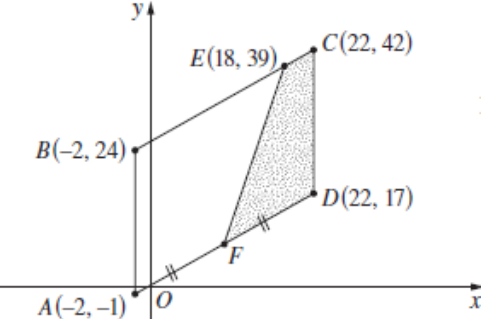


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<p><b>13</b></p>	<p><b>12</b> <b>b</b></p>	<p>The points <math>A(-2, -1)</math>, <math>B(-2, 24)</math>, <math>C(22, 42)</math> and <math>D(22, 17)</math> form a parallelogram as shown. The point <math>E(18, 39)</math> lies on <math>BC</math>. The point <math>F</math> is the midpoint of <math>AD</math>.</p> <p>(i) Show that the equation of the line through <math>A</math> and <math>D</math> is <math>3x - 4y + 2 = 0</math>.</p> <p>(ii) Show that the perpendicular distance from <math>B</math> to the line through <math>A</math> and <math>D</math> is 20 units.</p> <p>(iii) Find the length of <math>EC</math>.</p> <p>(iv) Find the area of the trapezium <math>EFDC</math>.</p>	 <p>Not to scale</p>	<p><b>2</b></p> <p><b>1</b></p> <p><b>1</b></p> <p><b>2</b></p>
<p>(i) <math>\text{grad } AD = \frac{17+1}{22+2}</math></p> $= \frac{18}{24}$ $= \frac{3}{4}$ $y + 1 = \frac{3}{4}(x + 2)$ $4y + 4 = 3x + 6$ $3x - 4y + 2 = 0$ <p>(ii) Use <math>B(-2, 24)</math> and <math>3x - 4y + 2 = 0</math></p> $d = \frac{ ax_1 + by_1 + c }{\sqrt{a^2 + b^2}}$ $= \frac{ 3(-2) - 4(24) + 2 }{\sqrt{3^2 + (-4)^2}}$ $= \frac{ -100 }{\sqrt{25}}$ $=  -20 $ $= 20 \quad \therefore 20 \text{ units}$		<p>(iii) <math>d = \sqrt{(22-18)^2 + (42-39)^2}</math></p> $= \sqrt{16+9}$ $= \sqrt{25}$ $= 5 \quad \therefore 5 \text{ units}$ <p>(iv) Midpoint of <math>AD</math></p> $= \left( \frac{22-2}{2}, \frac{17-1}{2} \right)$ $= (10, 8)$ <p>Now, distance <math>(10, 8)</math> to <math>(22, 17)</math>:</p> $d = \sqrt{(22-10)^2 + (17-8)^2}$ $= \sqrt{144+81}$ $= \sqrt{225}$ $= 15 \quad \therefore 15 \text{ units}$ <p><math>\therefore</math> Area of trapezium:</p> $A = \frac{1}{2} \times 20(5 + 15)$ $= 10(20)$ $= 200 \quad \therefore 200 \text{ units}^2$		<p>State Mean</p> <p><b>1.82/2</b></p> <p><b>0.83/1</b></p> <p><b>0.91/1</b></p> <p><b>1.10/2</b></p>

State Mean:  
**1.82/2**  
**0.83/1**  
**0.91/1**  
**1.10/2**

\* These solutions have been provided by [projectmaths](#) and are not supplied or endorsed by the Board of Studies

### Board of Studies: Notes from the Marking Centre

- (i) Most candidates found the gradient and then, using an appropriate point, found the required equation. Some correctly substituted two appropriate points into the given equation to establish the required result.

Common problems were:

- using the incorrect formula to find the gradient
- using an incorrect point, which meant they could not establish the equation of  $AD$ .

- (ii) Most candidates found the required distance using the correct formula. Some attempted to find the equation of the perpendicular line from  $B$  to  $AD$ , then the point of intersection of this line with  $AD$ , and then applied the distance formula to give the result of 20 units.

Common problems were:

- not including absolute value notation in their response
- using the incorrect formula for perpendicular distance.

- (iii) This question was well done by most candidates.

Common problems were:

- arithmetic errors, such as

$$\begin{aligned}\sqrt{(18 - 22)^2 + (39 - 42)^2} &= 4 + 3 \\ &= 7\end{aligned}$$

- using the incorrect formula

$$EC = \sqrt{(18 - 22)^2 - (39 - 42)^2} \text{ for the distance of } EC.$$

- (iv) Most candidates correctly used either the formula for the area of a trapezium or the formula for the area of a triangle.

Common problems were:

- not using their result from (b) (ii) in their answer
- using the incorrect value of  $h = 25$  for the height of the trapezium.

Source: [http://www.boardofstudies.nsw.edu.au/hsc\\_exams/](http://www.boardofstudies.nsw.edu.au/hsc_exams/)