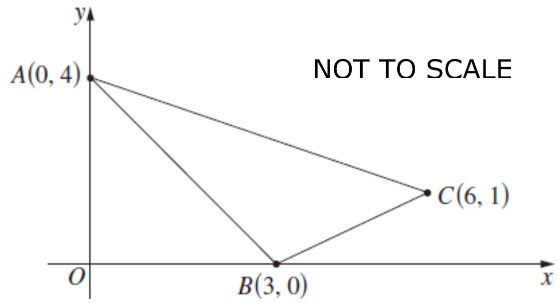
2014 **12b** The points $A(0, 4)$, $B(3, 0)$ and $C(6, 1)$ form a triangle, as shown in the diagram.



(i) Show that the equation of AC is $x + 2y - 9 = 0$. **2**

(ii) Find the perpendicular distance from B to AC. **2**

(iii) Hence, or otherwise, find the area of $\triangle ABC$. **2**

(i)

$$\text{grad } AC = \frac{1-4}{6-0} = \frac{-3}{6} = -\frac{1}{2}$$

$$y - 4 = -\frac{1}{2}(x - 0)$$

$$2y - 8 = -x$$

$$x + 2y - 8 = 0$$

(ii) Use $B(3, 0)$ and $x + 2y - 8 = 0$

$$d = \left|\frac{ax_1 + by_1 + c}{\sqrt{a^2 + b^2}}\right| = \left|\frac{1(3) + 2(0) - 8}{\sqrt{1^2 + 2^2}}\right| = \left|\frac{-5}{\sqrt{5}}\right| = \frac{5}{\sqrt{5}} = \sqrt{5}$$

$\therefore \sqrt{5}$ units

(iii) Length of AC:

$$d = \sqrt{(6-0)^2 + (1-4)^2} = \sqrt{36+9} = \sqrt{45} = 3\sqrt{5}$$

$\therefore 3\sqrt{5}$ units

$$\text{Area} = \frac{1}{2} \times 3\sqrt{5} \times \sqrt{5} = 7.5$$

$\therefore 7.5$ units^2

State Mean:
1.82
1.63
1.60

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by BOSTES.

Board of Studies: Notes from the Marking Centre

(i) This part was answered quite well with many candidates scoring full marks. Most candidates chose to use either the point-gradient formula or the two-point formula.

Common problems were:

- using incorrect formulae for the gradient and/or point-gradient form of a line
- miscalculating the gradient by using incorrect coordinates

- neglecting to show working and not writing the equation in general form as required.

(ii) A high percentage of candidates correctly used the 'perpendicular distance formula'.

Common problems were:

- substituting incorrect values into the perpendicular distance formula
- leaving out the square root sign in the denominator and/or the absolute value signs in the formula.

(iii) Most candidates used their answer to (b)(ii) in their solution. The area of the triangle was then easily found after finding the length of *AC*.

Common problems were:

- not using the result from (b)(ii) as the perpendicular height of the triangle;
- using $A = \frac{1}{2}ab \sin C$ with angle $\angle ABC = 90^\circ$;
- making arithmetic errors in the distance formula calculation;
- using an incorrect area formula.

http://www.boardofstudies.nsw.edu.au/hsc_exams/2014/pdf_doc/2014-maths.pdf