

Mathematic preparation work

The tasks below need to be completed before starting the course. The submission information is with each task. The questions covered are based on the higher GCSE content and focus on algebra skills.

Task 1:

Complete the four interactive resources using the link below to revise 4 key skills for A-level. You will need to take a screen shot of your score at the end of each resource. Bring this to your first lesson for your teacher to see.

CIMT Step up to A-level: <http://www.cimt.org.uk/projects/mepres/step-up/index.htm>

Task 2:

When completing these questions, think carefully about your mathematical presentation as this will be vital in helping you to be successful at A-level. The marks stated will help you to see the amount of working expected and this should take you approximately 1 hour to complete based on the marks available. You will submit this in your first lesson.

1 Simplify these expressions.

a $\frac{x^3 \times x^4}{x^2}$ (1 mark)

b $(2x^3)^4$ (1 mark)

c $\frac{9x^{\frac{1}{2}}}{(27x^{-2})^{\frac{2}{3}}}$ (3 marks)

2 Solve $2x^2 \times 4x^4 = 512$ (2 marks)

3 Find the value of x .

$$x^{-\frac{4}{3}} = \frac{1}{256} \quad (2 \text{ marks})$$

4 a Write $\sqrt{240}$ in the form $a\sqrt{15}$, where a is an integer. (1 mark)

b Expand and simplify $(2 - \sqrt{3})(5 + 2\sqrt{3})$. (2 marks)

c Simplify $\frac{2 + \sqrt{5}}{3 - \sqrt{5}}$ giving your answer in the form $a + b\sqrt{c}$, where a , b and c are rational numbers. (3 marks)

5 The area of a triangle is given as $(7 + 3\sqrt{3}) \text{ cm}^2$.

The base of the triangle is $(5 - \sqrt{3}) \text{ cm}$, and the perpendicular height is $(p + q\sqrt{3}) \text{ cm}$.

Find the values of p and q . (4 marks)

6 Expand and simplify these expressions.

a $3(x-2y)$ (1 mark)

b $(2x-3)(3x+5)$ (2 marks)

c $(x-2)^2(x+5)$ (3 marks)

7 Fully factorise these expressions.

a $2xy-4x$ (1 mark)

b x^2+2x-3 (1 mark)

8 Solve these equations.

a $3x-7=17$ (1 mark)

b $x^2-6x+5=0$ (2 marks)

c $2x^2-5x+1=0$ (2 marks)

9 Solve these pairs of simultaneous equations.

a $2x+y=7$ (3 marks)
 $3x-y=8$

b $y=3x-1$ (3 marks)
 $3y=6x+1$

c $2x-y=9$ (4 marks)
 $x^2+y^2=17$

10 Solve these inequalities.

a $7x-6 \leq 8$ (1 mark)

b $3x+2 \geq 7x-4$ (2 marks)

c $x^2+12x-28 > 0$ (2 marks)

11 The function f is defined as $f(x)=5x+2$

Find the value of $f(-4)$. (1 mark)

Task 3:

Complete the following questions, showing your method is required. You will submit this in your first lesson.

- 9 The points A, B and C have coordinates $(-1, 1)$, $(5, 8)$ and $(8, 3)$ respectively.
- (i) Show that $AC = AB$. [2]
 - (ii) Write down the coordinates of M, the midpoint of BC. [1]
 - (iii) Show that the lines BC and AM are perpendicular. [2]
 - (iv) Find the equation of the line AM. [2]

- 10 (i) Illustrate on one graph the following three inequalities.

$$y \geq x - 1$$

$$x \geq 2$$

$$2x + y \geq 8$$

Draw suitable boundaries and shade areas that are **excluded**. [4]

- (ii) Write down the minimum value of y in this region. [1]

- 11 Michael is at a point A and the base of a church tower is at a point F, as shown in Fig. 11. He measures the bearing of the tower to be 060° . Michael walks 100 metres due North to the point B from where he measures the bearing of F to be 110° . The triangle ABF is in the horizontal plane.

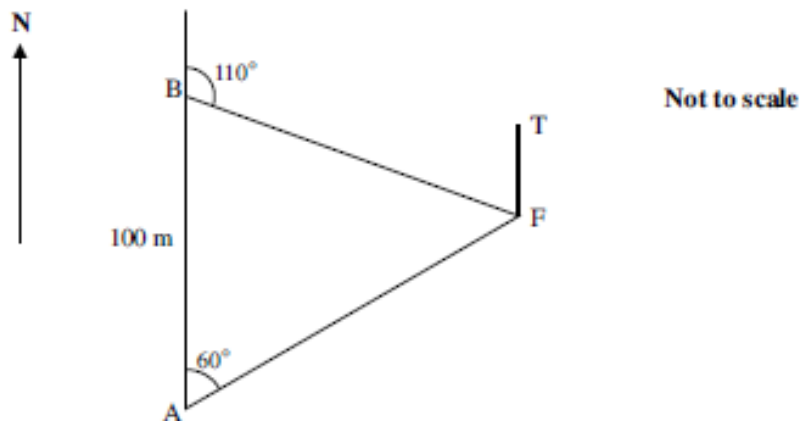


Fig. 11

- (i) Show that $AF = 122.7$ m, correct to 4 significant figures, and find BF. [5]

Michael finds that the angle of elevation of the top of the tower, T, from A is 10° .

- (ii) Find the height of the tower. [2]

C is the point on AB that is nearest to F.

- (iii) Find CF and the angle of elevation from C to the top of the tower, correct to 1 decimal place. [5]

