5th Year Algebra 2 Test: **Name:………………………….**
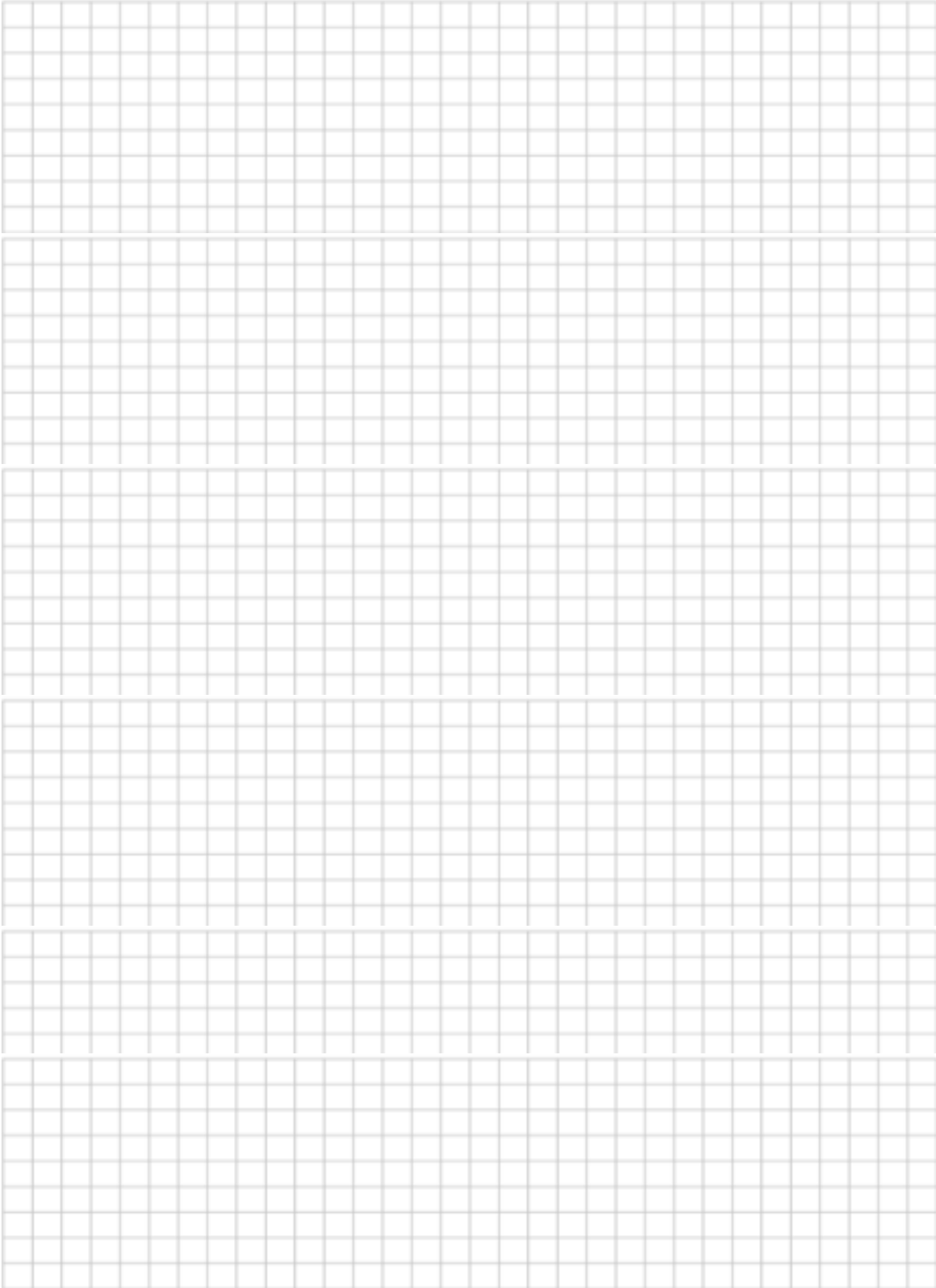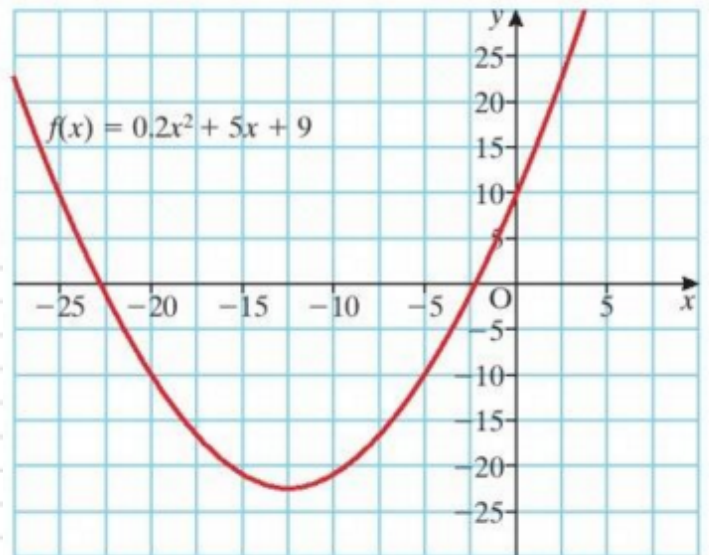
1.)   Solve: $\left(y + \frac{4}{y}\right)^2 - 9\left(y + \frac{4}{y}\right) + 20 = 0$

2.) If x_1 and x_2 are the roots of the equation $f(x) = 0.2x^2 + 5x + 9 = 0$ and $x_1 > x_2$, using the graph, find an approximate value for
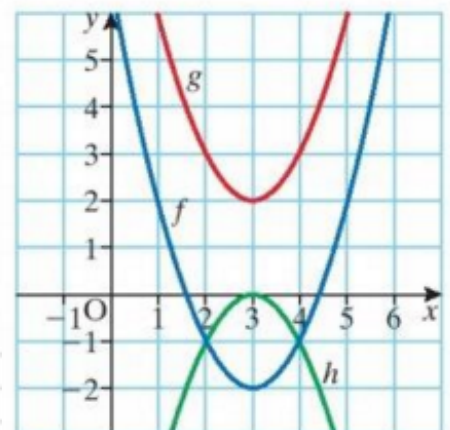
(a) $(x_2 - x_1)$

(b) $(x_2 + x_1)$

$f(x) = 0.2x^2 + 5x + 9$

3.) What is the discriminant of the equation : $ax^2 + bx + c$?
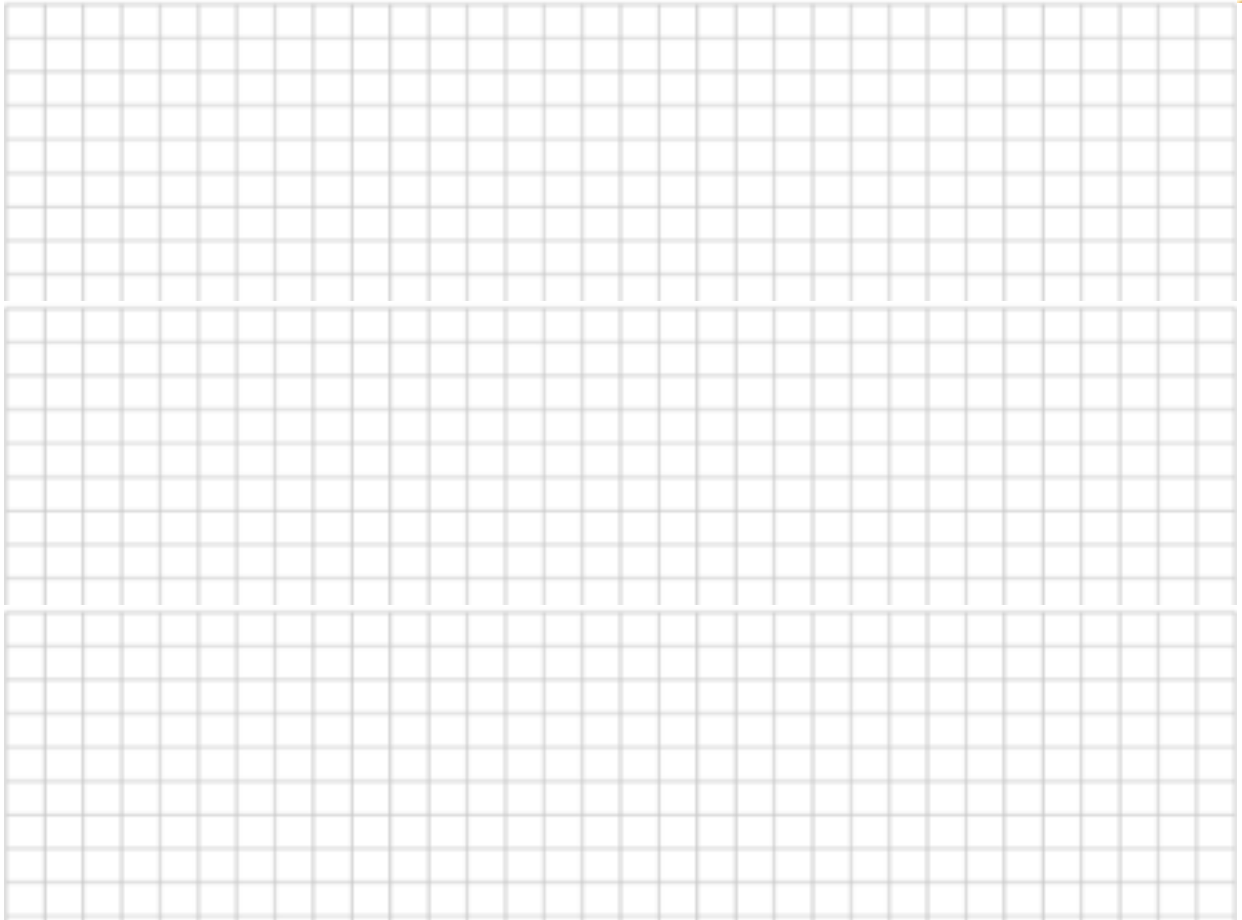
4.) By inspection, state which of the curves $-$ f, g and h $-$ have

(i) real and distinct roots

(ii) real and equal roots

(iii) imaginary roots.

(iv) In the case of real roots, estimate from the graph the roots of each equation.

5.) Find the value of k for which the equation $(k - 2)x^2 + x(2k + 1) + k = 0$ has equal roots.

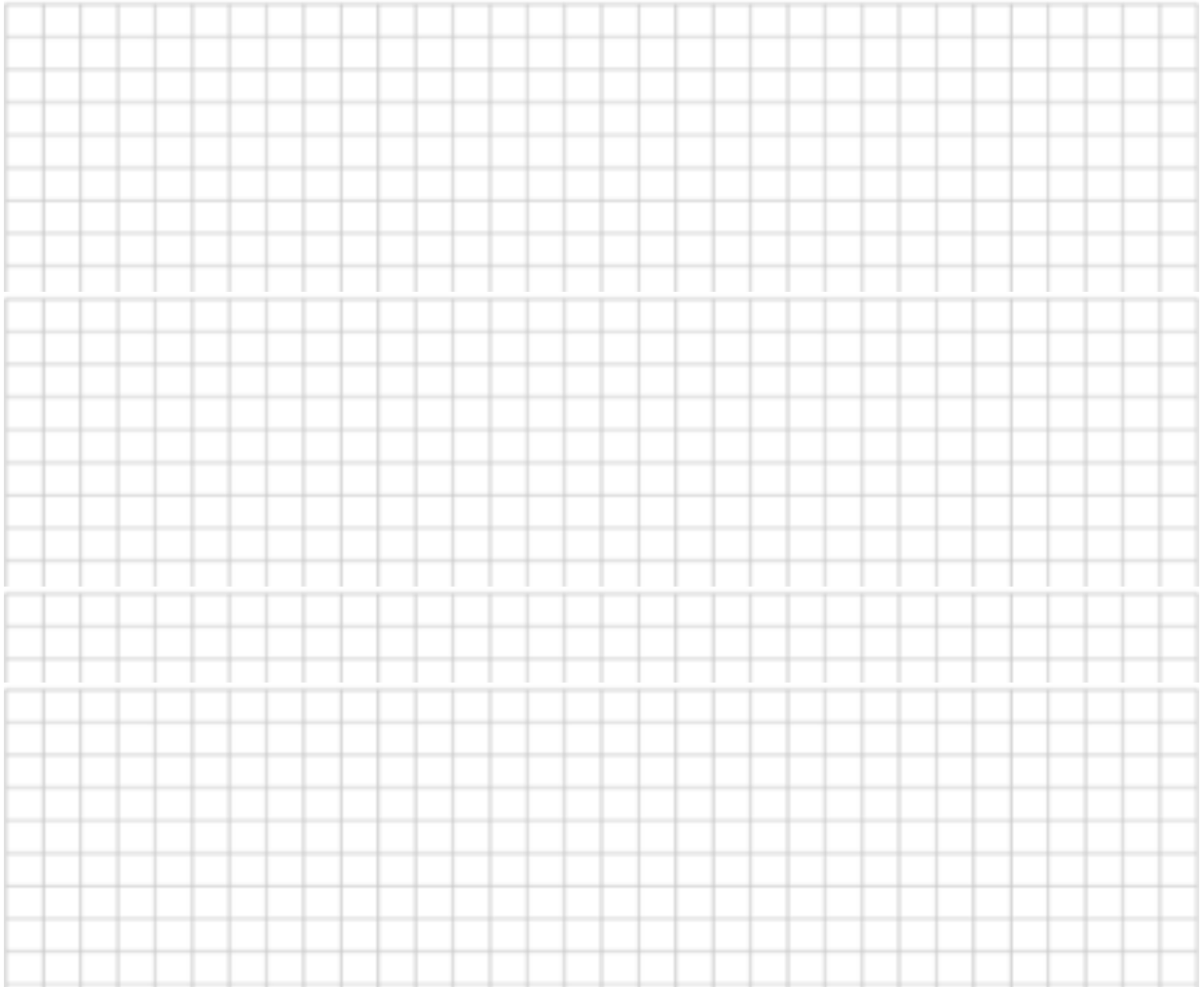**6.)** Solve to find x,y :

$$xy = 4$$
$$2x - y + 2 = 0$$
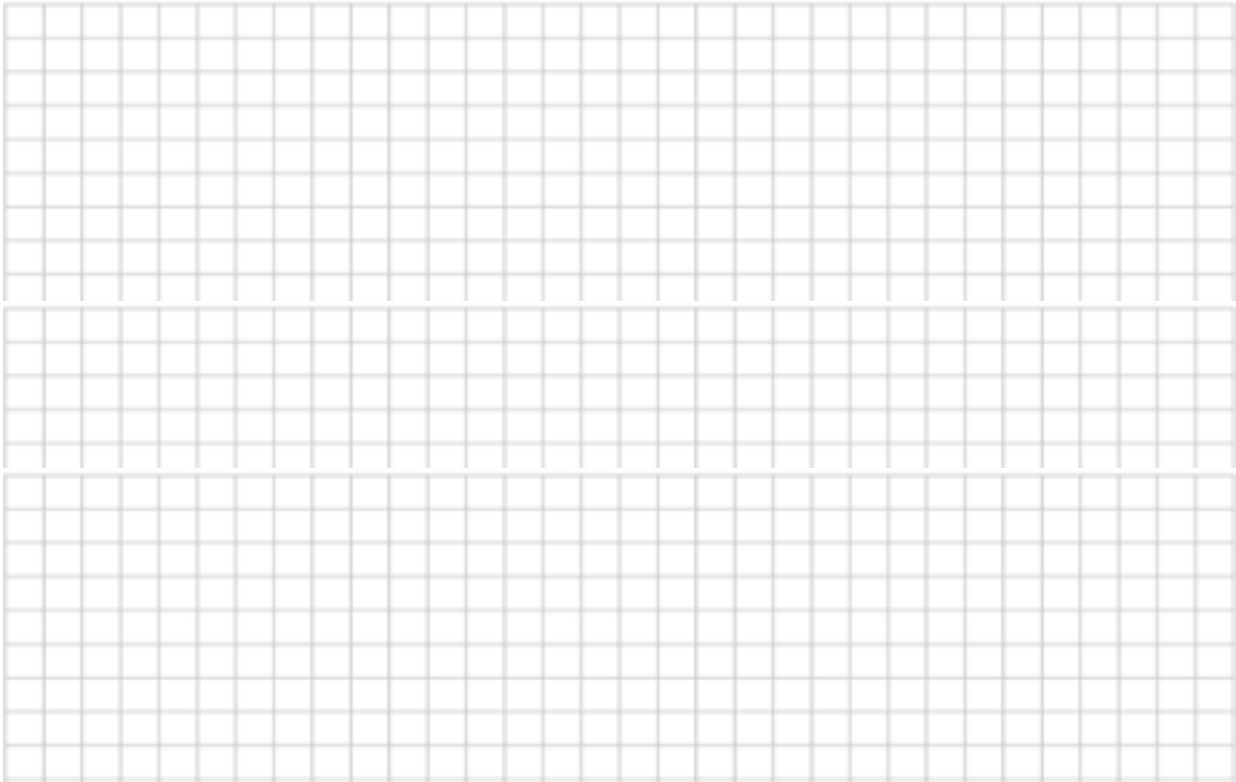
**7.)**   Solve to find s,t : $s = 2t - 1$

$$3t^2 - 2ts + s^2 = 9$$

8.)   The hypotenuse of a right-angled triangle is 6 cm longer than the shortest side. The third side is 3 cm longer than the shortest side. Find the length of the shortest side.

9.) Express $2x^2 - 12x + 7$ in the form $a(x - b)^2 + c$.

10.)

(i) Write down the coordinates (p, q) of the minimum point of each of these graphs.

(ii) Write the equation of each graph in the form
  (a) $y = (x - p)^2 + q$
  (b) $y = ax^2 + bx + c$.

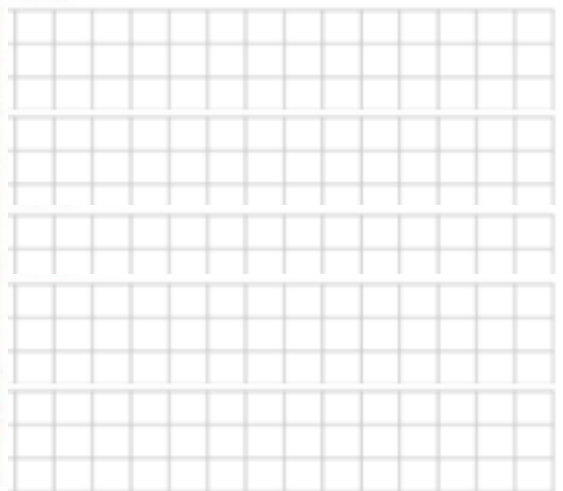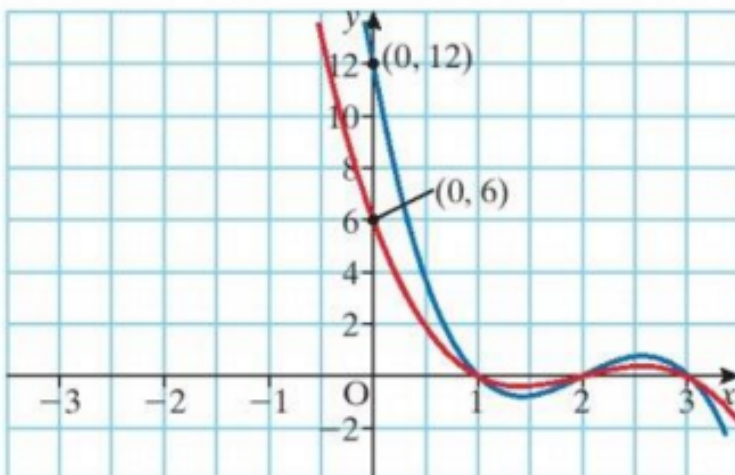(iii) By picking a suitable point on each graph (other than the minimum point), verify each equation.
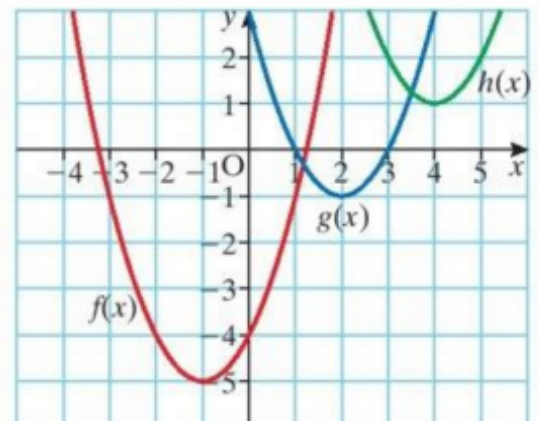
11.) Letting $X = \dfrac{4 + \sqrt{3}}{\sqrt{2}}$ and $Y = \dfrac{4 - \sqrt{3}}{\sqrt{2}}$, find in its simplest form: $\dfrac{X}{Y}$
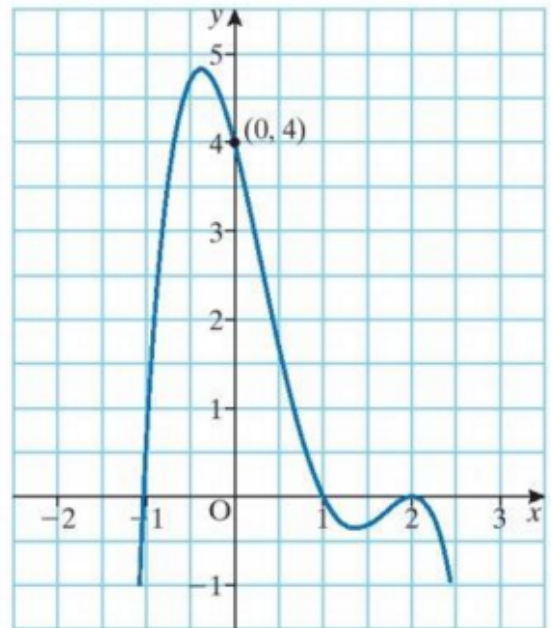
12.) State the factor theorem:

13.) Write a polynomial expression for each of the following cubic graphs.

14.) The graph of a polynomial
$f(x) = ax^4 + bx^3 + cx^2 + dx + e$
is given in the diagram.

(i) Find the factors of the expression.
(ii) Hence find the values of a, b, c, d and e.

15.) A campsite is in the shape of a triangle with busy roads running along all three sides of the site.
The sides of the site are 110 m, 150 m and 170 m in length.

  (i) Using 20 m = 1 cm, draw a scaled diagram of this site.

  (ii) Show on the diagram the best position to pitch a tent so that it is as far away as possible from all three roads. Show your construction lines.
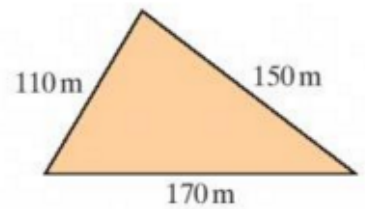
110 m   150 m   170 m

16.) A sculptor makes a small-scale clay model of a sculpture she is planning.
The model is 40 cm tall. The final sculpture will be 100 cm tall.

  (i) What is the scale factor of the enlargement?

  (ii) What is the scale factor for the volume?

  (iii) The volume of the model is 240 cm^3.
What will be the volume of the final sculpture?