

1. Find the coefficient of  $x^2$  in the expansion of  $(2x - 1)^7$ .

2 ~~3.~~ Find the coefficient of  $x^6$  in the expansion of  $\left(2x - \frac{1}{2}\right)^{10}$ .

3 ~~13.~~ Find the value of  $c$  for which the coefficient of  $x^4$  in the expansion of  $(2x + c)^7$  is 70.

4 ~~15.~~ (a) Find  $k$  such that the equation  $2x^2 + kx + 2k = 0$  has exactly one solution.

- 5 ~~17~~. Find the value of  $a$  if the equations  $2x + 3y = 6$  and  $6x + ay = 9$  are
- parallel.
  - perpendicular.

- 6 ~~18~~. The coefficient of  $x$  in the expansion of  $\left(x + \frac{1}{ax^2}\right)^7$  is  $\frac{7}{3}$ . Find the value(s) of  $a$ .

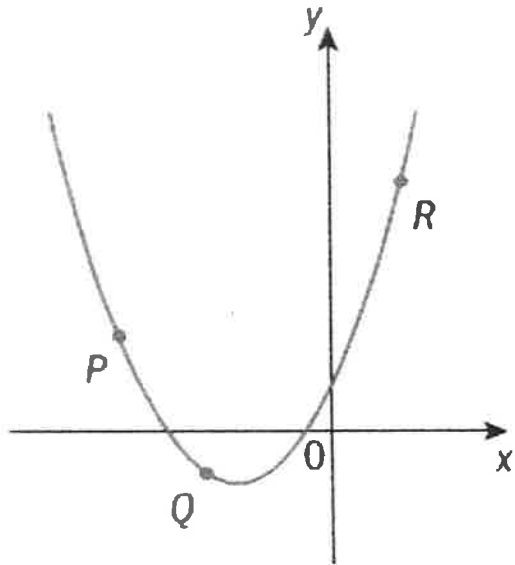
- 7 ~~19~~.
- Find the equation of the line which passes through both the intersection of  $x + y = 2$  and  $2x + 3y = 8$  and the point  $(0, 0)$ .
  - Simplify  $\frac{x^3 - y^3}{x^3 + y^3} \times \frac{(x - y)^2 + xy}{x^2 + xy + y^2}$

8 **25.** Find the term of  $x^5$  in the expansion  $(1 + 2x)^8$ .

9 **26.** The function  $f$  is given by  $f(x) = ax^2 + bx + c$ . Part of the graph of  $f$  is shown.

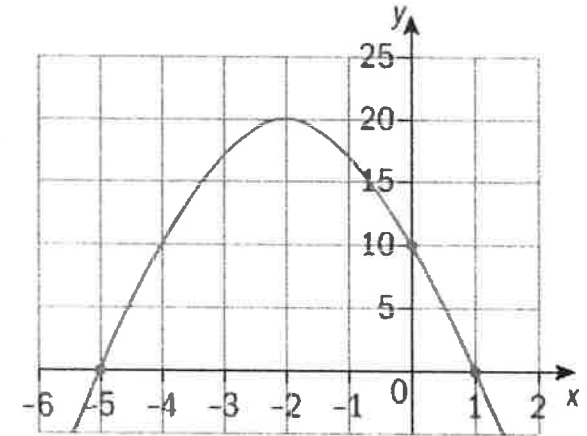
The graph of  $f$  passes through the points  $P(-10, 12)$ ,  $Q(-5, -3)$  and  $R(5, 27)$ .

Find the values of  $a$ ,  $b$  and  $c$ .



EXAM-STYLE QUESTIONS

- 10 ✎ Let  $f(x) = a(x - p)(x - q)$ . Part of the graph of  $f$  is shown.  
The graph passes through the points  $(-5, 0)$ ,  $(1, 0)$  and  $(0, 10)$ .
- Write down the value of  $p$  and of  $q$ .
  - Find the value of  $a$ .



- 11 ✎ Let  $f(x) = a(x + 3)^2 - 6$
- Write down the coordinates of the vertex of the graph of  $f$ .
  - Given that  $f(1) = 2$ , find the value of  $a$ .
  - Hence find the value of  $f(3)$ .

12 **5** The equation  $x^2 + 2kx + 3 = 0$  has two equal real roots.  
Find the possible values of  $k$ .

13 **6** Let  $f(x) = 2x^2 + 12x + 5$ .

**a** Write the function  $f$ , giving your answer in the form

$$f(x) = a(x - h)^2 + k.$$

**b** The graph of  $g$  is formed by translating the graph of  $f$  by 4 units in the positive  $x$ -direction and 8 units in the positive  $y$ -direction. Find the coordinates of the vertex of the graph of  $g$ .

- 14 ✎ The height,  $h$  metres above the water, of a stone thrown off a bridge is modeled by the function  $h(t) = 15t + 20 - 4.9t^2$ , where  $t$  is the time in seconds after the stone is thrown.
- a What is the initial height from which the stone is thrown?
  - b What is the maximum height reached by the stone?
  - c For what length of time is the height of the stone greater than 20 m?
  - d How long does it take for the stone to hit the water below the bridge?

#### EXAM-STYLE QUESTION

- 15 ✎ a Find the common ratio for the geometric series  $\frac{1}{12} + \frac{1}{8} + \frac{3}{16} + \dots$
- b Hence, find the least value of  $n$  such that  $S_n > 800$

## EXAM-STYLE QUESTION

- 16 **4** For a geometric progression with  $u_3 = 24$  and  $u_6 = 3$ , find  $S_x$ .
- 17 **4** In a geometric sequence, the first term is 3 and the sixth term is 96.  
**a** Find the common ratio.  
**b** Find the least value of  $n$  such that  $u_n > 3000$
- 18 **5** In an arithmetic sequence, the first term is 28 and the common difference is 50. In a geometric sequence, the first term is 1 and the common ratio is 1.5  
Find the least value of  $n$  such that the  $n$ th term of the geometric sequence is greater than the  $n$ th term of the arithmetic sequence.

## EXAM-STYLE QUESTION

- 19 **7** Find the term in  $x^4$  in the expansion of  $\left(\frac{x}{2} - 3\right)^7$

## EXAM-STYLE QUESTIONS

- 20 **1** Consider the arithmetic sequence 3, 7, 11, 15, ...
- a** Write down the common difference.
  - b** Find  $u_{71}$
  - c** Find the value of  $n$  such that  $u_n = 99$



- 21 **2** The first three terms of an infinite geometric sequence are 64, 16 and 4.
- a** Write down the value of  $r$ .
  - b** Find  $u_4$ .
  - c** Find the sum to infinity of this sequence.

- 22 **3** In an arithmetic sequence,  $u_6 = 25$  and  $u_{12} = 49$
- a** Find the common difference.
  - b** Find the first term of the sequence.

- 23 **4** Consider the arithmetic sequence 22,  $x$ , 38, ...
- a** Find the value of  $x$ .
  - b** Find  $u_{31}$ .

## EXAM-STYLE QUESTION

- 24 **8** Find the  $x^3$  term in the expansion of  $(2x + 3)^5$

## EXAM-STYLE QUESTION

- 25 **2** Consider the arithmetic sequence 3, 4.5, 6, 7.5, ...  
**a** Find  $u_{63}$ .      **b** Find the value of  $n$  such that  $S_n = 840$