# Revision: Algebra, functions and Equations (Topics 1 & 2)

**Coursebook chapters: 1–7**

**1.** **Do not use a calculator to answer this question.**

Solve the equation log3(2*x* + 1) = 2.

*(accessible to students on the path to grade 3 or 4) [4 marks]*

**2.** Find the first three terms in the binomial expansion of .

*(accessible to students on the path to grade 3 or 4)* *[5 marks]*

**3.** The function *f* is defined by *f*(*x*) = (3*x*) for *x* > 0.

(a) State the range of *f*.

(b) Find an expression for *f* −1(*x*).

(c) Find the exact solution of the equation *f*(*x*) = 5.

*(accessible to students on the path to grade 3 or 4) [5 marks]*

**4.** *f*(*x*) = *ax*3 – *x*2 + 2*x* + *b*

The remainder when *f*(*x*) is divided by (*x* + 2) is 5 and the remainder when *f*(*x*) is divided by (2*x* – 1) is 3.

Find the values of *a* and *b*.

*(accessible to students on the path to grade 3 or 4) [5 marks]*

**5.** **Do not use a calculator to answer this question.**

(a) Write *x*2 – 3*x* + 5 in the form (*x* – *p*)2 + *q*.

(b) Hence find the range of the quadratic function *f*(*x*) = .

*(accessible to students on the path to grade 5 or 6) [5 marks]*

**6.** Find the exact values of *k* for which the equation *kx*2 – 4*x* + (*k* + 1) = 0 has equal roots.

*(accessible to students on the path to grade 5 or 6)* *[5 marks]*

**7.** Arun and Bea are starting training for a swimming race. On the first day they both swim 500 m . On each subsequent day, Arun swims 25 m more than the previous day, and Bea swims 5% farther than on the previous day.

(a) Find the total distance Arun will swim over the first 20 days.

(b) On which day will Bea first swim more than 1000 m?

(c) After how many days will Bea have swum a total of 5000 m more than Arun?

*(accessible to students on the path to grade 5 or 6)* *[9 marks]*

**8. Do not use a calculator to answer this question.**

Two functions are defined by *f*(*x*) = 3*x*2 and *g*(*x*) = 4e*x* + 1.

(a) State the range of *g*(*x*)

(b) Solve the equation *f*(*g*(*x*)) = 75.

*(accessible to students on the path to grade 5 or 6) [8 marks]*

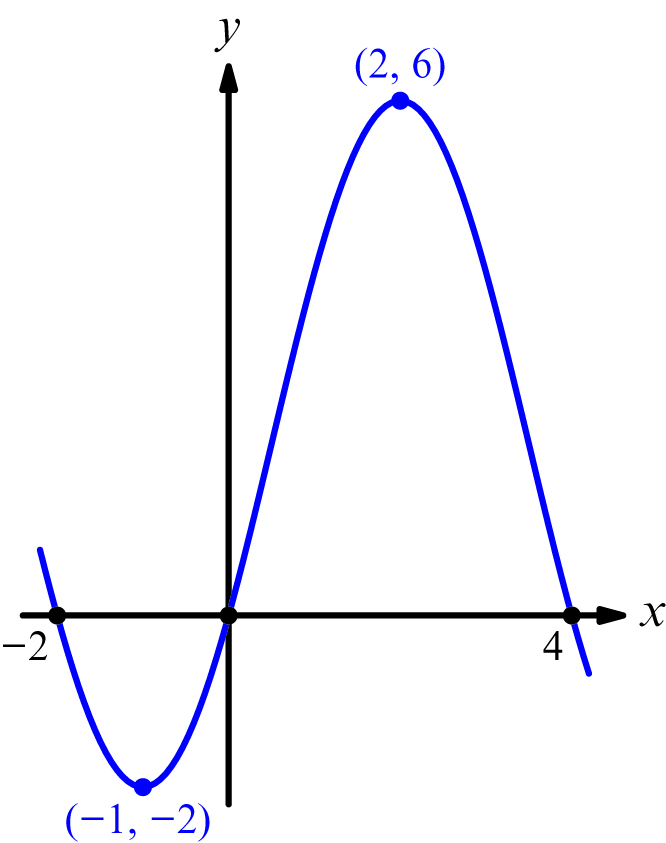
**9.** (a) Show that (*x* – 3) is a factor of *p*(*x*) = 2*x*3 – 5*x*2 – 6*x* + 9.

(b) Factorise *p*(*x*) completely.

(c) Hence sketch the graph of *y* = *p*(*x*).

*(accessible to students on the path to grade 5 or 6) [9 marks]*

**10.** The graph of *y* = *f*(*x*) is shown in the diagram.



(a) Sketch the graph of *y* = 3*f* (−*x*) showing the coordinates of all the zeros and turning points.

(b) Sketch the graph of *f*(2*x*) + 1, showing the coordinates of the -intercept and turning points.

*(accessible to students on the path to grade 5 or 6)* *[6 marks]*

**11.** Solve the equation 2*x* – 4 × 2−*x* = 3.

*(accessible to students on the path to grade 7)* *[5 marks]*

**12.** For the rational function *f*(*x*) = ,

(a) State the equation of the vertical asymptote.

(b) In the case *a* = 3, *b* = 5, solve the equation *f*(*x*) = *f* −1(*x*).

*(accessible to students on the path to grade 7) [5 marks]*