Yr 12 revision Dec 2017

**1.** Simplify

(i) ,

[1]

(ii) .

[3

**2.** (i) Find the discriminant of *kx*2 *–* 4*x* + *k* in terms of *k.*

[2]

(ii) The quadratic equation *kx*2 *–* 4*x* + *k =* 0 has equal roots. Find the possible values of *k.*

[3]

**3.** Solve the simultaneous equations

*x* + 2*y* – 6 = 0, 2*x*2 + *y*2 = 57.

[6]

**4.** (i) Expand (*x* – 2)2(*x* + 1), simplifying your answer.

[3]

(ii) Sketch the curve *y* = (*x* – 2)2(*x* + 1), indicating the coordinates of all intercepts with the axes.

[3]

**5.** (i) The line joining the points *A*(4, 5) and *B*(*p*, *q*) has mid-point *M*(–1, 3). Find *p* and *q*.

[3]

*AB* is the diameter of a circle.

(ii) Find the radius of the circle.

[2]

(iii) Find the equation of the circle, giving your answer in the form *x*2 + *y*2 + *ax* + *by* + *c* = 0.

[3]

(iv) Find an equation of the tangent to the circle at the point (4, 5).

[5]

**6.** Solve the simultaneous equations

4*x*2 + *y*2 = 10, 2*x* – *y* = 4.

[6]

**7.** *A* is the point (2, 7) and *B* is the point (−1, −2).

(i) Find the equation of the line through *A* parallel to the line *y* = 4*x* − 5, giving your answer in the form *y* = *mx* + *c*.

[3]

(ii) Calculate the length of *AB*, giving your answer in simpliﬁed surd form.

[3]

(iii) Find the equation of the line which passes through the mid-point of *AB* and which is perpendicular to *AB*. Give your answer in the form *ax* + *by* + *c* = 0, where *a* ,*b* and *c* are integers.

[6]

**8.** (i) Find the gradient of the line *l*1which has equation 4*x –* 3*y* + 5 = 0.

[1]

(ii) Find an equation of the line *l*2*,* which passes through the point (1, 2) and which is perpendicular to the line *l1*, giving your answer in the form *ax* + *by* + *c =* 0.

[4]

The line *l1* crosses the *x*-a*x*is at *P* and the line *l*2crosses the *y*-a*x*is at *Q.*

(iii) Find the coordinates of the mid-point of *PQ*.

[3]

(iv) Calculate the length of *PQ*, giving your answer in the form , where a and *b* are integers.

[3]

**9.** (i) Expand and simplify (*x* − 5)(*x* + 2)(*x* + 5).

[3]

(ii) Sketch the curve *y* = (*x* − 5)(*x* + 2)(*x* + 5), giving the coordinates of the points where the curve crosses the axes.

[3]

**10.** (i) Sketch the curve *y* = .

[2]

(ii) The curve *y* =  is translated by 3 units in the negative *x*-direction. State the equation of the curve after it has been translated.

[2]

(iii) The curve *y* =  is stretched parallel to the *y*-axis with scale factor 4 and, as a result, the point *P*(1, 1) is transformed to the point *Q*. State the coordinates of *Q*.

[2]

**11.** (i) Express  in the form *a* – *b*, where *a* and *b* are positive integers.

[3]

(ii) Express  in simplified surd form.

[2]

**12.** Express  in the form *a* + *b*, where *a* and *b* are integers.

[4]