Mathematics **Date: ……**

Revision Paper 1

Answer **all** the questions.

1 **(i)** Simplify $(2x-3)^2-2(3-x)^2$. **[2]**

(ii) Find the coefficient of x^3 in the expansion of $(3x^2-3x+4)(5-2x-x^3)$. **[2]**

2 Express $\dfrac{3+\sqrt{20}}{3+\sqrt{5}}$ in the form $a+b\sqrt{5}$. **[4]**

3 Solve the simultaneous equations

$$x^2+y^2=34, \qquad 3x-y+4=0.$$ **[5]**

4 Solve the equation $2y^{\frac{1}{2}}-7y^{\frac{1}{4}}+3=0$. **[5]**

5 Express the following in the form 2^p.

(i) $(2^5\div 2^7)^3$ **[2]**

(ii) $5\times 4^{\frac{2}{3}}+3\times 16^{\frac{1}{3}}$ **[3]**

6 **(i)** Express $4+12x-2x^2$ in the form $a(x+b)^2+c$. **[4]**

(ii) State the coordinates of the maximum point of the curve $y=4+12x-2x^2$. **[2]**

7 **(i)** Sketch the curve $y=x^2(3-x)$ stating the coordinates of points of intersection with the axes. **[3]**

(ii) The curve $y=x^2(3-x)$ is translated by 2 units in the positive direction parallel to the x-axis. State the equation of the curve after it has been translated. **[2]**

(iii) Describe fully a transformation that transforms the curve $y=x^2(3-x)$ to $y=\frac{1}{2}x^2(3-x)$. **[2]**

8 A curve has equation $y=2x^2$. The points A and B lie on the curve and have x-coordinates 5 and $5+h$ respectively, where $h>0$.

(i) Show that the gradient of the line AB is $20+2h$. **[3]**

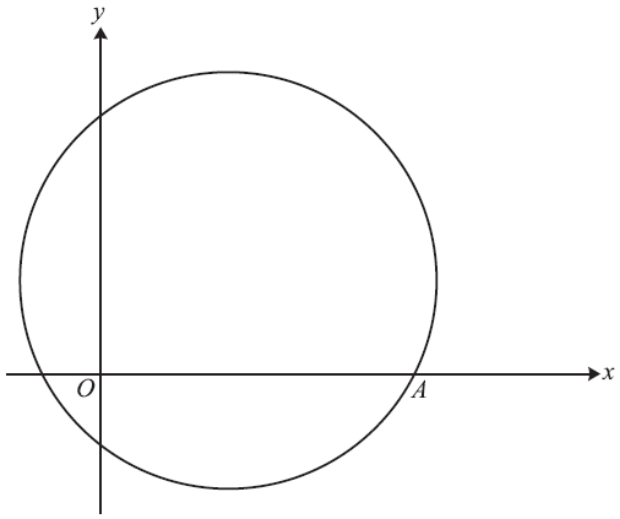
(ii) Explain how the answer to part **(i)** relates to the gradient of the curve at A. **[1]**

(iii) The normal to the curve at A meets the y-axis at the point C. Find the y-coordinate of C. **[3]**

9 Find the set of values of k for which the equation $x^2+2x+11=k(2x-1)$ has two distinct real roots. **[7]**

(Question 10 is on the next page)

10



The diagram shows the circle with equation $x^2 + y^2 - 8x - 6y - 20 = 0$.

(i) Find the centre and radius of the circle. **[3]**

The circle crosses the positive x-axis at the point A.

(ii) Find the equation of the tangent to the circle at A. **[6]**

(iii) A second tangent to the circle is parallel to the tangent at A. Find the equation of this second tangent. **[3]**

(iv) Another circle has centre at the origin O and radius r. This circle lies wholly inside the first circle. Find the set of possible values of r. **[2]**

11 The curve $y = 4x^2 + \frac{a}{x} + 5$ has a stationary point. Find the value of the positive constant a given that the y-coordinate of the stationary point is 32. **[8]**

END OF QUESTION PAPER