Mixed practice 5

1. Find the intersection of the graphs $x^2 + y^2 = 25$ and $x + y = 7$.

2. **a** Illustrate the region represented by the inequalities $x + y < 3$, $y \geqslant 0$, $y < 2x$.

   b Find the upper bound for the values of y that satisfy these inequalities.

3. Find the transformation that transforms the graph of $y = (x - 1)^2$ to the graph of $y = (x + 2)^2$.

4. If z is proportional to x^2 sketch the graph of z against x.

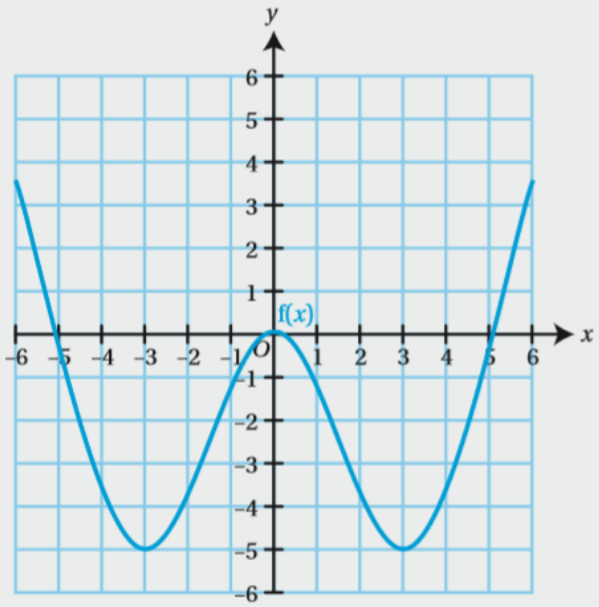
5. Two taxi companies have the following pricing structures:

   Company A charges £1.60 per kilometre.

   Company B charges £1.20 per kilometre plus £1.50 call-out charge.

   Find the length of the journey for which the two companies charge the same amount.

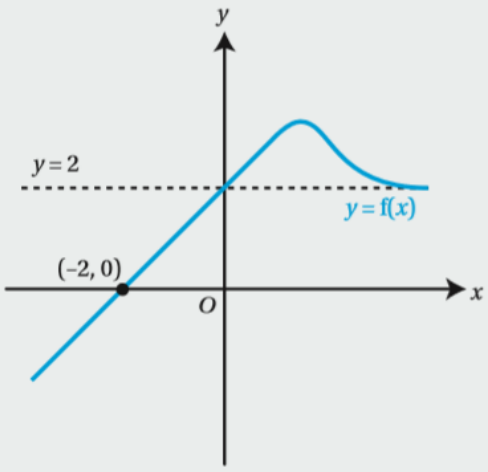
6. The graph of $y = f(x)$ is shown.



   a Sketch the graph of $y = f(x - 1) + 2$.

   b State the coordinates of the maximum point of the new graph.

7. The diagram shows a part of the graph of $y = f(x)$.



   Sketch the graph of $y = f(3x)$.

8 **i** The curve $y = x^2$ is translated 2 units in the positive x direction. Find the equation of the curve after it has been translated.

ii The curve $y = x^3 - 4$ is reflected in the x-axis. Find the equation of the curve after it has been reflected.

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9 A doctor thinks that mass of a baby can be modelled as a linear function of age. A particular baby had a mass of 4.1 kg aged 2 weeks, and 4.8 kg aged 5 weeks.

a If M is the mass of the baby aged n weeks, show that the straight line model results in the equation $M = 0.233n + 3.63$, where the coefficients have been rounded to three significant figures.

b Give an interpretation of the values 0.233 and 3.63 in the equation in part **a**.

c The normal mass of a healthy one-year-old baby is approximately between 10 and 12 kg. Is the linear model appropriate for babies as old as one year?

10 **i** Solve the simultaneous equations
$y = 2x^2 - 3x - 5, \qquad 10x + 2y + 11 = 0.$

ii What can you deduce from the answer to part **i** about the curve $y = 2x^2 - 3x - 5$ and the line $10x + 2y + 11 = 0$?

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11 Given that x is inversely proportional to y and z is proportional to x^2 sketch the graph of z against y.

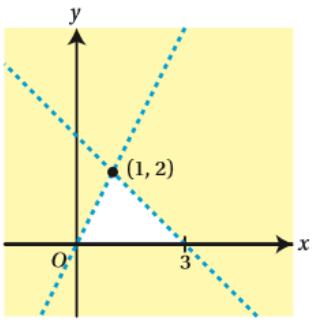
12 **a** By using an appropriate substitution find the exact solutions to the equation $x^4 + 36 = 13x^2$

b Hence solve the inequality $x^4 + 36 \leqslant 13x^2$.

Mixed practice 5

1 (3, 4) and (4, 3)

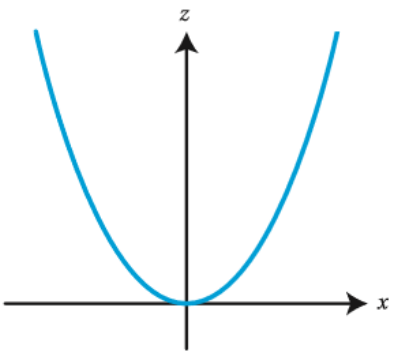
2 a



b 2

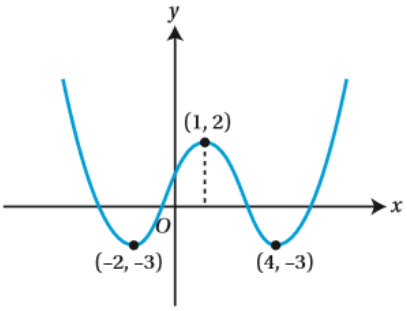
3 Translation left 3 units

4



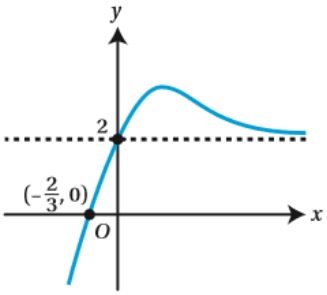
5 3.75 km

6 a



b (1, 2)

7



8 a $y = (x-2)^2$

b $y = 4 - x^3$

9 a Proof

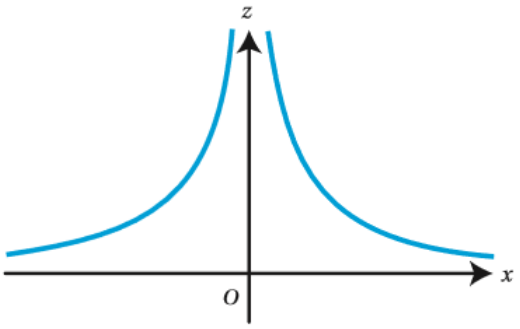
b $M = 3.63$ represents the weight at birth, 0.233 kg is the weight gain every week

c Not appropriate (predicts $M = 15.7$ kg)

10 a $x = -\frac{1}{2}, y = -3$

b The line is tangent to the curve.

11



12 a $x = \pm 2, \pm 3$

b $-3 \leqslant x \leqslant -2$ or $2 \leqslant x \leqslant 3$