Perth Academy National 5 Relationships Homework 3

1. Solve each of these pairs of simultaneous linear equations:

   (a) $2x + y = 3$
   $4x - y = 9$

   (b) $3x + 2y = 12$
   $4x - 3y = -1$

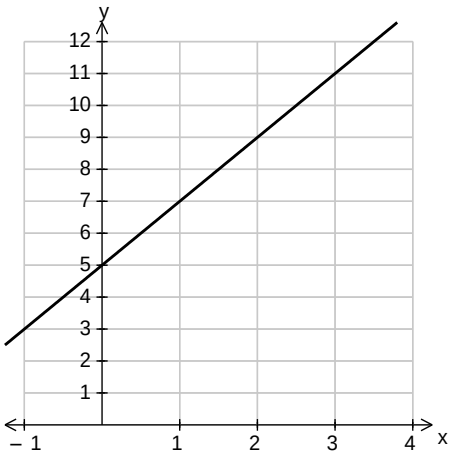
   (c) $3x + 4y = 1$
   $5x - 2y = -7$

   (d) $5x + 3y = 1$
   $3x - 2y = 12$

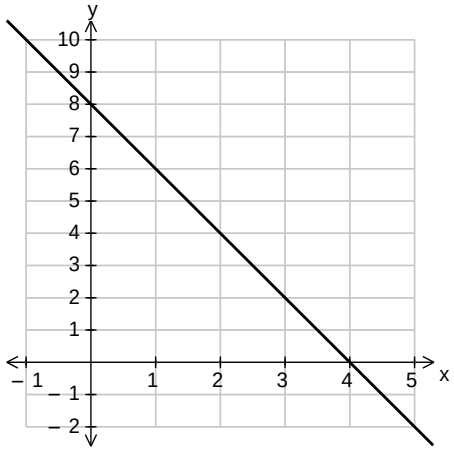
2. Find the coordinates of the point of intersection of the straight lines with equations $2x + y = 5$ and $x - 3y = 6$.

3. Find the equation of each of these straight lines.

   (a)



   (b)

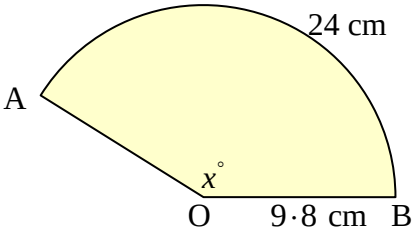


4. A tank contains 150 litres of water.
   The water is pumped out at a constant rate of 30 litres per minute.

   (a) Draw an accurate graph of the volume *V*, of water in the tank against the time *t*, in minutes.

   (b) Find an equation for *V* in terms of *t*.

5. The length of the arc AB in the diagram below is 24 cm.
   Find the size of the angle AOB.



6. Solve each of the following equations. No decimals.

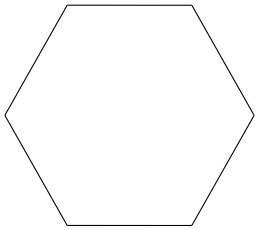
(a) $3x-5=2(1-2x)$ (b) $3-2a=5a+3$

(c) $(x+1)^2=(x-3)(x-4)$ (d) $\frac{2}{3}x=7$

7. Solve each of the following inequalities. No decimals.

(a) $5x-3\geq 17$ (b) $4(2x+3)>1-2x$

8. The regular hexagon sketched below has sides of length 8 cm.
Calculate its area.

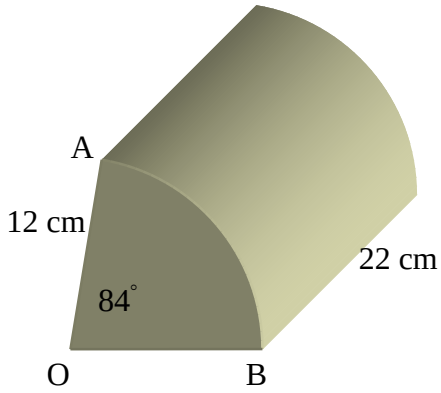


9. Simplify each of these fractions.

(a) $\frac{15x^3}{10x}$ (b) $\frac{(x+3)^4}{(x+3)^5}$ (c) $\frac{1}{x}+\frac{1}{x^2}$

(d) $\frac{3}{y}\div\frac{1}{y^2}$ (e) $\frac{3pq}{4}\times\frac{2}{p^2}$ (f) $\frac{4}{a}-\frac{3}{b}$

10. The cross-section of the prism sketched below is a sector of a circle of radius 12 cm. The prism has length 22 cm and $\angle AOB=84^\circ$.
Calculate the volume of the prism, correct to three significant figures.



11. Cylinder A has volume $100\,\text{cm}^3$. Cylinder B has twice the radius and half the height of A.
Calculate the volume of cylinder B.