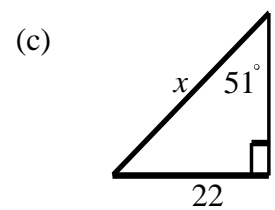
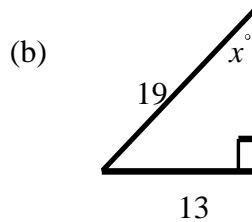
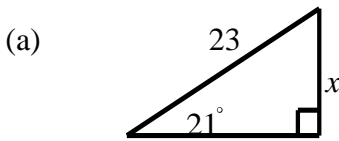
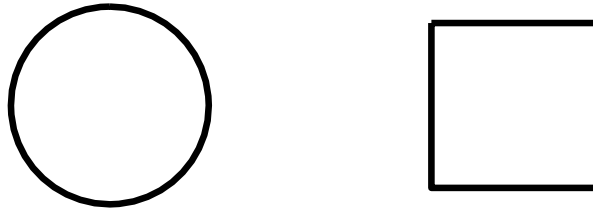


1. Find the value of  $x$  in each of these right-angled triangles. Lengths are in cm.



2. A rectangle has length  $4x$  cm and breadth  $3x$  cm. Find an expression for the length of a diagonal.
3. The circle below has circumference 20 cm and the square has perimeter 20 cm. Which has the bigger area? You must explain fully.



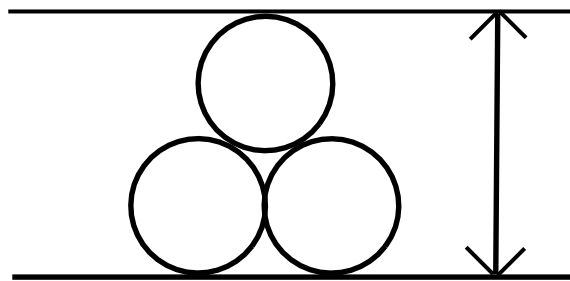
4. Solve, leaving your answer as a fraction, if necessary:

(a)  $5x - 3 = 2x + 11$

(b)  $4x - 7 = x - 10$

(c)  $3 \frac{1}{2} - x = 2x$

5. (a) Write down the first 10 prime numbers. 1 is NOT prime.  
(b) Write down all the factors of 120.
6. Find the total height of the following stack of touching circles, each with radius 8 units. [It will help to join the centres.]



7. A bus leaves Forfar at 1005 and arrives in Edinburgh at 1230. The distance is 65 miles. Calculate the average speed in mph, answering correct to 1 decimal place.
8. (a) A racing driver completes a lap of a racing circuit in 3 minutes 30 seconds at an average speed of 204 km/hr. How far does he travel?  
(b) How long would it take to complete this lap at an average speed of 153 km/hr?

9. Evaluate:

(a)  $2^4$

(b)  $3^3$

(c)  $-1^2$

(d)  $6^3$

(e)  $-2^3$

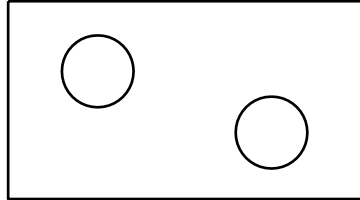
(f)  $6^3$

10. The distance from the sun to an asteroid is  $5.2 \times 10^8$  km, and the speed of light is  $3.0 \times 10^5$  km/sec. How long does it take for a beam of light to travel from the sun to the asteroid?

Answer in minutes, to 3 significant figures.

11. The diagram below shows a sketch of a rectangular lawn measuring 24 metres by 12.5 metres, with two circular flower beds, each of radius 2.4 metres.

Calculate the area of the grass.



12. (a) The price of an item, including 35% profit, is £1080.

What is the price before the profit is added?

(b) The price of an item after a 23% loss, is £731.50.

What was the original price?

13. Do these without a calculator. Show all working.

(a)  $\frac{1}{2} + \frac{1}{3}$

(b)  $\frac{5}{6} - \frac{1}{2}$

(c)  $0.3 + 0.4 \times 5$

(d)  $1\frac{1}{2} + 1\frac{1}{4}$

(e)  $2\frac{1}{2} - 1\frac{2}{5}$

(f)  $3\frac{1}{4} - 2\frac{2}{3}$

14. The area of a triangle for which the lengths of the sides are  $a$ ,  $b$  and  $c$  units can be found using the formula

$$A = \sqrt{s(s-a)(s-b)(s-c)}, \text{ where } s = \frac{1}{2}(a+b+c).$$

Use this formula to find the area of a triangle which has sides of length  $a=7$ ,  $b=6$  and  $c=5$  units.