1 (a) Simplify.

$$\frac{18y^6}{(3y)^2}$$

(a) ..... [2]

(b) Expand and simplify.

$$(3x - 2)^2$$

(b) ..... [2]

4

2 (a) Calculate.

$$(2 \times 10^5) \div (8 \times 10^3)$$

(a) ..... [2]

(b) Estimate the value of $\dfrac{4{\cdot}16 \times 10^9}{(4{\cdot}83 \times 10^{-3}) \times (2{\cdot}31 \times 10^6)}$.

Give your answer in standard form.

(b) ..... [3]

5

3

Fabien is practising taking penalties.
There are three possible independent outcomes.

- He scores a goal.
- He misses the goal.
- The goalkeeper saves the penalty.

The probability that he scores a goal is $\frac{3}{8}$.

The probability that the goalkeeper saves the penalty is $\frac{1}{2}$.

Fabien takes 2 penalties.

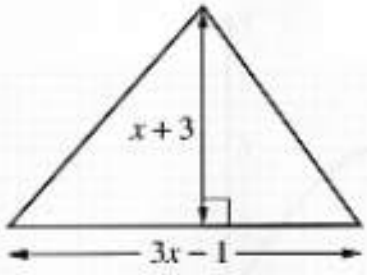
What is the probability that Fabien scores at least one goal?

..... [4]

4

4 In this question, all the lengths are in centimetres.

A triangle has a perpendicular height of $(x + 3)$ and a base of $(3x - 1)$.



(a) The area of the triangle is 24 cm^2.
Show that

$$3x^2 + 8x - 51 = 0.$$

.....

.....

..... [3]

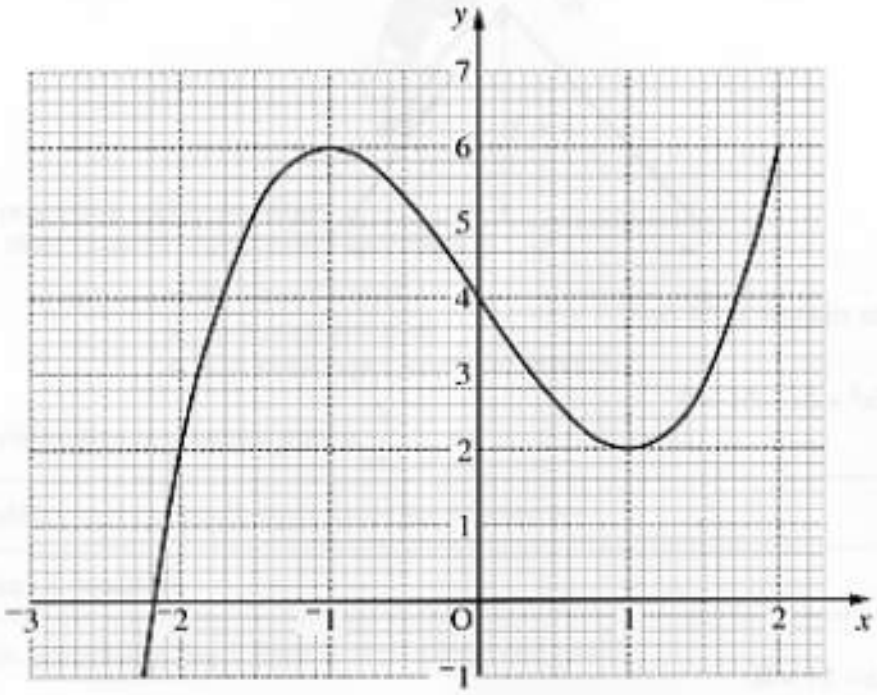
(b) Solve $3x^2 + 8x - 51 = 0$.
Hence, find the length of the base of the triangle.

(b).....cm [3]

6

5 The graph of $y = x^3 - 3x + 4$ is drawn below.

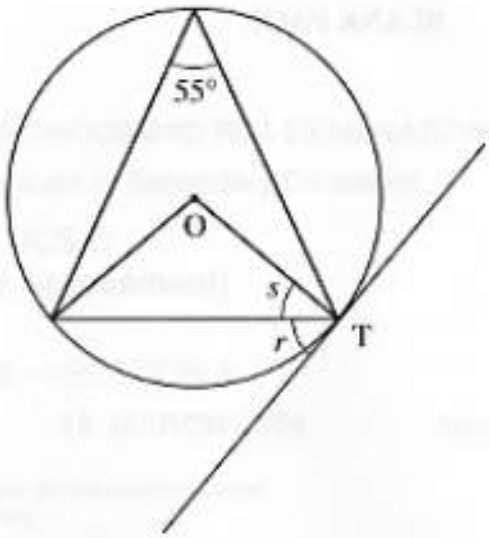
By adding a straight line to the graph, solve the equation $x^3 - 3x + 4 = x + 3$.



$x =$ ..... [3]

3

6



Not to scale

O is the centre of the circle.
T is the point of contact of a tangent to the circle.

Work out angles r and s.
Give a reason for each answer.

$r =$ ..... ° because .....

.....

$s =$ ..... ° because .....

..... [3]

3