Mixed Exercise - 1

1.

Given that a is a positive integer, show that

$$\sqrt{3a}\left(\sqrt{12a} + a\sqrt{3a}\right)$$

is always a multiple of 3

2.

$y = at^2 - 2at$

$x = 2a\sqrt{t}$

Express y in terms of x and a.

Give your answer in the form

$$y = \frac{x^p}{ma^3} - \frac{x^q}{na}$$

where p, q, m and n are integers.

3.

Solve $2y + \frac{2-3y}{4} = \frac{1}{4}$

Show clear algebraic working.

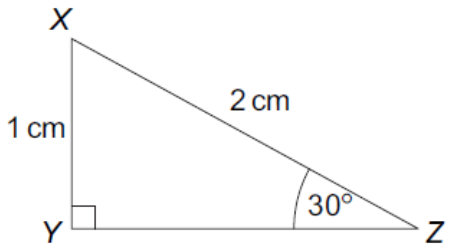
4.

Write this ratio in its simplest form

$$\sqrt{12} : \sqrt{48} : \sqrt{300}$$

5.

(a) *XYZ* is a right-angled triangle.



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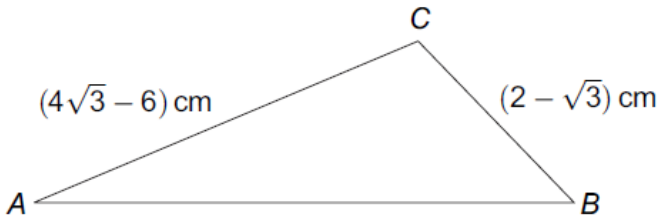
Use triangle *XYZ* to show that $\sin 60° = \frac{\sqrt{3}}{2}$

(b) Triangle ABC has an obtuse angle at C.



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Given that $\sin A = \frac{1}{4}$, use triangle ABC to show that angle $B = 60°$

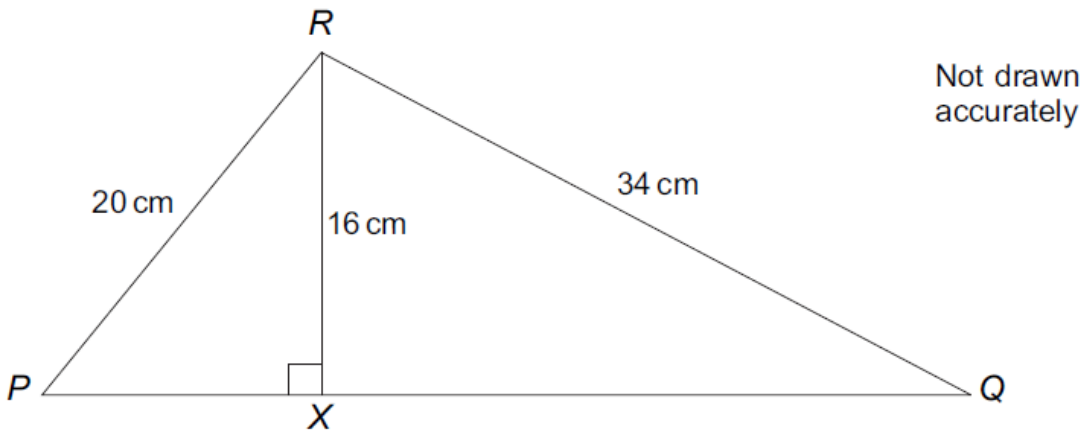
6.

Work out the ratio $(3x+2y)(3x-4y) : 3x(2x-5y)$ when $y = 0$

Give your answer as simply as possible.

7.

In triangle PQR, X is a point on PQ.
RX is perpendicular to PQ.

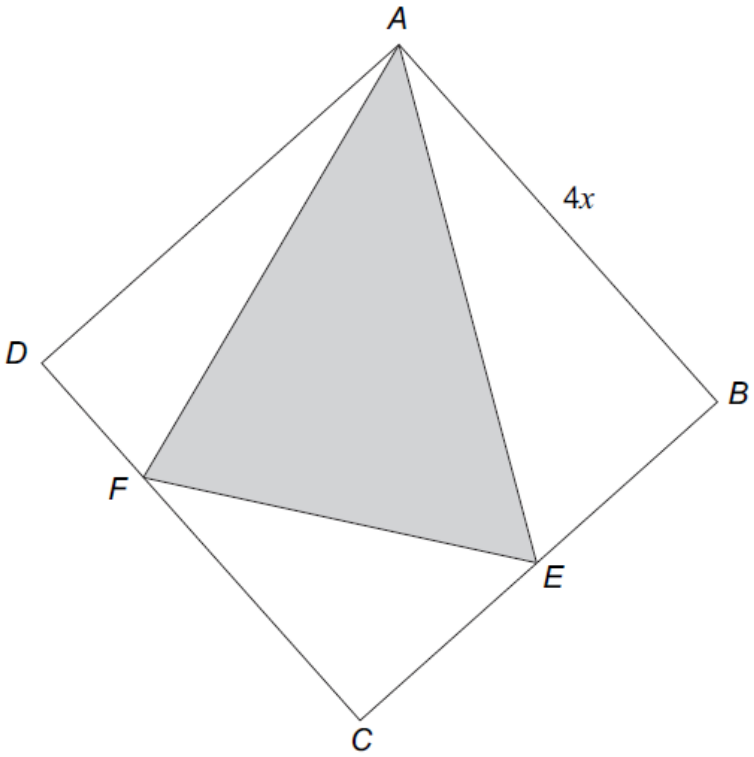


Work out the ratio $PX : XQ$
Give your answer in its simplest form.

8.

ABCD is a square of side length $4x$.

E is the midpoint of *BC*.
$DF : FC = 1 : 3$



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You are given that

$$\text{area of triangle } AEF = kx^2$$

Work out the value of k.

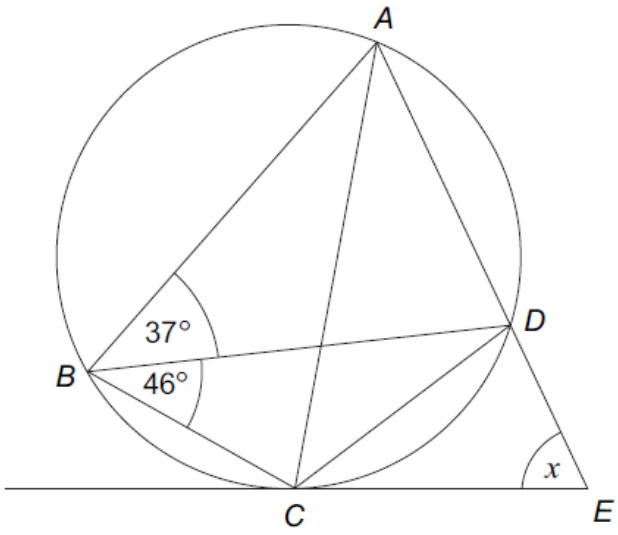
9.

Factorise fully $(x+y)^2+(x+y)(2x+5y)$

10.

The diagram shows a cyclic quadrilateral *ABCD*.

ADE is a straight line.
CE is a tangent to the circle.



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Work out the size of angle x.