Non-Calculator

- BODMAS

1. Evaluate $5.04 + 8.4 \div 7$

2. Evaluate $6.2 - 0.131 \times 40$

3. Evaluate $837 \div 30 + 5.7$

- Fractions

1. Evaluate $2\dfrac{3}{8} \div \dfrac{5}{16}$

2. Evaluate $\dfrac{2}{5}$ of $3\dfrac{1}{2} + \dfrac{4}{5}$

3. Evaluate $\dfrac{2}{7}\left(1\dfrac{3}{4} + \dfrac{3}{8}\right)$

- Simple Indices

1. Simplify $x^2(x^3 - 3x)$

2. Simplify $\dfrac{12a^3b^7}{16ab^2}$

- Expand Brackets/Factorise

1. Expand and simplify $(2x - 5)(x^2 + 3x - 7)$

2. Expand and simplify $3(2x - 4) - 4(3x + 1)$

3. Factorise fully $2m^2 - 18$

- Change of Subject

1. Change the subject of the formula $y = ax^2 + c$ to x

2. Change the subject of the formula to m. $L = \dfrac{\sqrt{m}}{k}$

3. A formula used to calculate the flow of water in a pipe is

$$f = \frac{kd^2}{20}.$$

Change the subject of the formula to d.

- **Simultaneous Equations**

1. Find the point of intersection of the straight lines with equations $x + 2y = -5$ and $3x - y = 13$.

2. Andrew and Doreen each book in at the Sleepwell Lodge.

   (*a*) Andrew stays for 3 nights and has breakfast on 2 mornings.
   His bill is £145.
   Write down an algebraic equation to illustrate this.

   (*b*) Doreen stays for 5 nights and has breakfast on 3 mornings.
   Her bill is £240.
   Write down an algebraic equation to illustrate this.
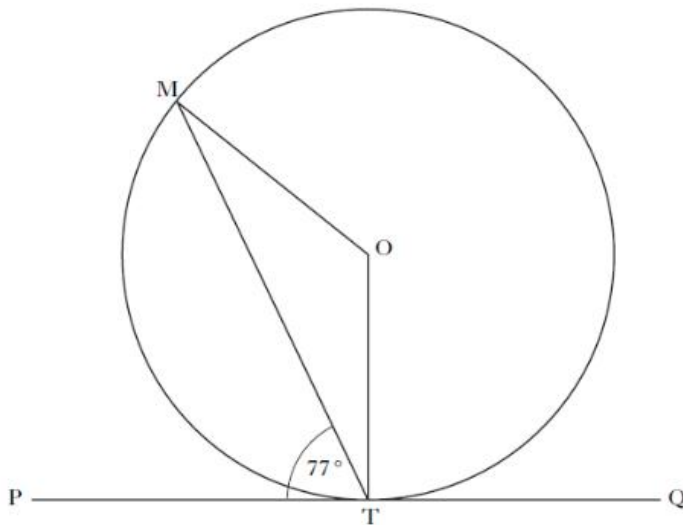
   (*c*) Find the cost of one breakfast.

Simplify Surds

1. Simplify $\sqrt{12} + 5\sqrt{3} - \sqrt{27}$

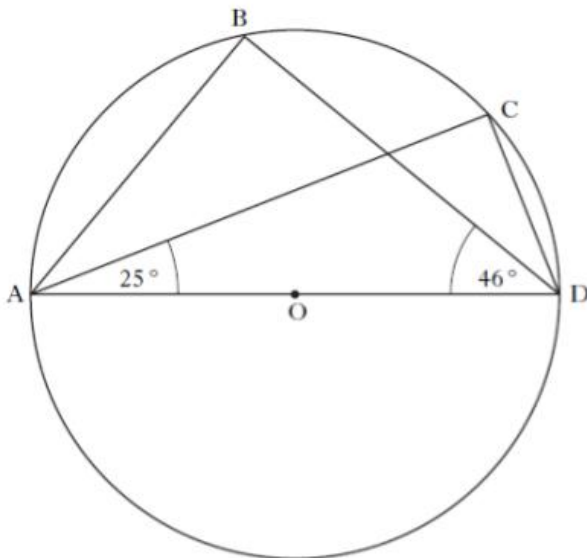2. Simplify $2\sqrt{75}$

3. Simplify $\dfrac{\sqrt{24}}{\sqrt{2}}$

1.

The tangent PQ touches the circle, centre O, at T.
Angle MTP is 77°.

(a) Calculate the size of angle MOT.

(b) The radius of the circle is 8 centimetres.
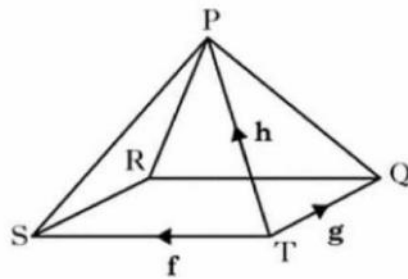Calculate the length of chord MT.

2.

AD is a diameter of a circle, centre O.
B and C are points on the circumference of the circle.
Angle CAD = 25°.
Angle BDA = 46°.
Calculate the size of angle BAC.

- 3D Coordinates/Vectors

1. The diagram shows a square based pyramid PQRST.

Express $\overrightarrow{RP}$ in terms of f, g and h.
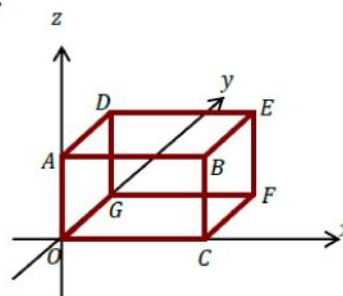
2. Two vectors are defined as $u = \begin{pmatrix} 2 \\ -5 \end{pmatrix}$ and $v = \begin{pmatrix} -4 \\ 3 \end{pmatrix}$.

   (a) Find the resultant vector $u + 3v$.

   (b) Find $|u + 3v|$.

3. Look at the cuboid shown on the coordinate diagram.

   The coordinates of point E are $(6, 3, 4)$

   (a) State the coordinates of F

   (b) State the coordinates of G

   (c) What is the shortest distance between points D and C?

- Algebraic Fractions

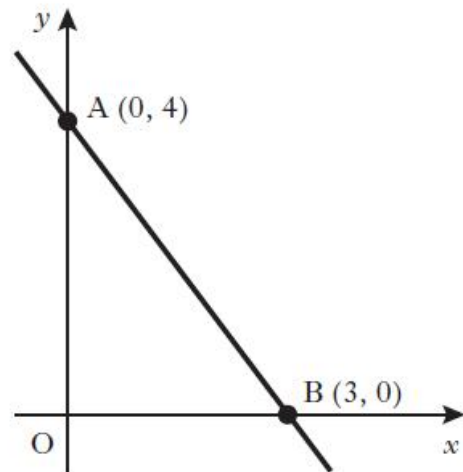1. Simplify $\dfrac{(2x+5)^2}{(2x-1)(2x+5)}$

2. Express

$$\frac{2}{x-1} + \frac{4}{x+2} \qquad x \neq 1, \; x \neq -2$$

as a single fraction in its simplest form.

3. Simplify $\dfrac{3}{m} + \dfrac{4}{(m+1)}$

- Equation of a Straight Line

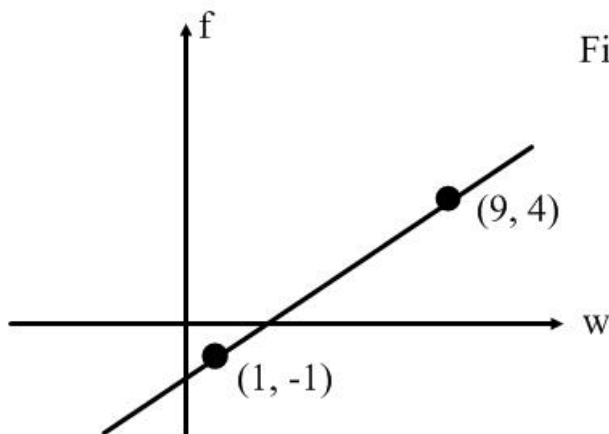1. Find the equation of the straight line AB.

A (0, 4)

B (3, 0)

O

2.

A straight line is represented by the equation $y = mx + c$.

Sketch a possible straight line graph to illustrate this equation when $m > 0$ and $c < 0$.

3.

f

(9, 4)

W

(1, -1)

Find the equation of the line shown.

- **Using the Discriminant**

1. State the nature of the roots of the equation $5x^2 - 4x + 1 = 0$

2. The equation below has equal roots. Find the possible values of p.

$$3x^2 + px + 3 = 0$$

3. The equation below has 2 real and distinct roots. Find the range of possible values of p.

$$px^2 + 5x - 6 = 0$$

- **Completing the Square**

1. Write the equation below in the form $(x + a)^2 + b$

$$x^2 - 10x + 12$$

2. $$f(x) = x^2 + 6x - 7$$

(a) Write $f(x)$ in the form $(x + a)^2 + b$.

(b) State the coordinates of the turning point of $f(x)$.