National 5 Mathematics Homework
Exercise 6

The Straight Line

1. The line $y = 3x + 4$ has gradient of 3 and meets the y axis (y intercept) at the point(0, 4).
   Write down the value of the gradient and y intercept for the following lines.

   (a) $y = 5x - 3$ (b) $y = -3x + 5$ (c) $y = 5 - \frac{1}{2}x$ **(6)**

2. Write down the equation of the line that has a gradient of 4 and cuts the y-axis at -2. **(2)**

3. Find the equation of the line AB which goes through the points A(-5, -3) and B (7, 2) **(5)**

4. Rearrange into y = mx + c and then write down the gradient and y- intercept of each equation.

   (a) $8x + 4y = 20$ (b) $9x + 5y = 15$ (c) $10x - 5y + 20 = 0$ **(9)**

5. Find the equation of the line that is:-

   (a) Parallel to a line with gradient of 4 and goes through the point (7, 4)

   (b) Parallel to the line y = 3x + 6 and goes through (4, -5)

   (c) Parallel to the line 3x + 6y = 12 and goes through (-5, -7) **(7)**

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Exercise 7

Equations and Inequalities

1. Solve:-

(a) $9x-1=7x+15$ (b) $2(x+3)=11$ (c) $2(1+5x)=3x+51$ **(7)**

2. By first eliminating the fraction solve these equations:-

(a) $\frac{2}{3}x-4=6$ (b) $\frac{2}{3}(2x+4)=2$ (c) $\frac{x+2}{3}+\frac{x+3}{4}=1$ **(8)**

3. The photographs shown have the same area.

Form an equation, and solve it to find the dimensions of each photograph. **(5)**

x

x

x + 5

$x-4$

4. Solve these inequalities:-

(a) $5x+8\leq 3x+18$ (b) $2(2x+4)\leq 36-6x$ (c) $15-7x\geq 12-x$ **(7)**

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Exercise 8

Simultaneous Equations

1. Solve these simultaneous equations algebraically:

(a) $\begin{aligned} 5y + 4x &= 14 \\ 3y - 4x &= 2 \end{aligned}$ (b) $\begin{aligned} 2y + 3x &= 12 \\ 5y - x &= 13 \end{aligned}$ (c) $\begin{aligned} 3x + 2y &= 24 \\ 2x + 3y &= 26 \end{aligned}$ **(11)**

2. Fiona and Ross each book in at the Sleepwell Lodge.

(a) Fiona stays for 3 nights and has breakfast on 2 mornings. Her bill is £230.
Write down an algebraic equation to illustrate this.

(b) Ross stays for 5 nights and has breakfast on 3 mornings. His bill is £380.
Write down an algebraic equation to illustrate this.

(c) Find the cost of one breakfast. **(6)**

3. (a) A cinema has 300 seats which are either standard or deluxe.
Let x be the number of standard seats and y be the number of deluxe seats.
Write down an algebraic expression to illustrate this information.

(b) A standard seat costs £4 and a deluxe seat costs £6.
When all seats are sold the ticket sales are £1380.
Write down an algebraic expression to illustrate this information.

(c) How many standard seats and how many deluxe seats are there in the cinema? **(6)**

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Exercise 9

Changing the Subject

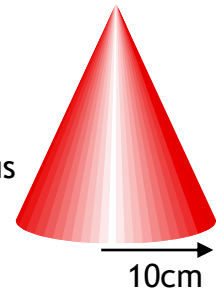
1. Make x the subject of the formulae.

(a) $x-b=5$ (b) $12=n-x$ (c) $\frac{x}{5}=6$ (d) $a=\frac{d}{x}$

(e) $5x+4=m$ (f) $f=5-2x$ (g) $\frac{x+5}{4}=m$ (h) $m=2(x+f)$

(i) $\frac{x+y}{m}=\frac{4m}{5}$ (j) $x^2+y=6$ (k) $y=\frac{3}{5}(x-z)$ (l) $p=\frac{2\sqrt{x}}{3}$ **(21)**

2. The formula for finding the volume of the cone is $v=\frac{1}{3}\pi r^2 h$.

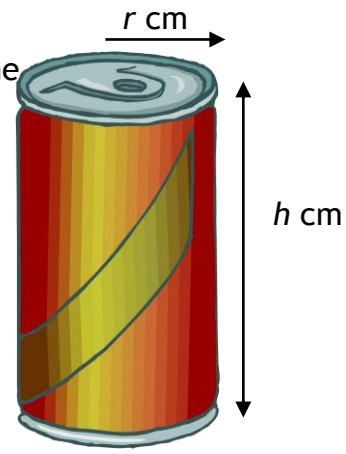


(a) Make h the subject of the formula.

(b) If the volume of the cylinder shown is 3140 cm^3 and the radius is 10cm, find the height of the cylinder. **(4)**

3. This can of Cola has a total surface area given by the formula $A=2\pi r(r+h)$

(a) Make h the subject of the formula.



(b) If the surface area of the can is 596.6cm^3 and the radius is 5cm, what is the height? **(6)**

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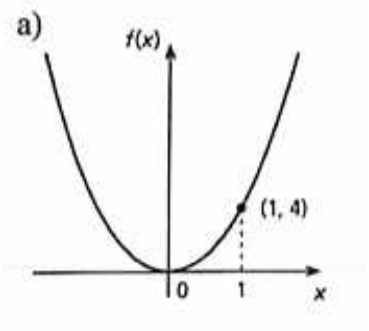
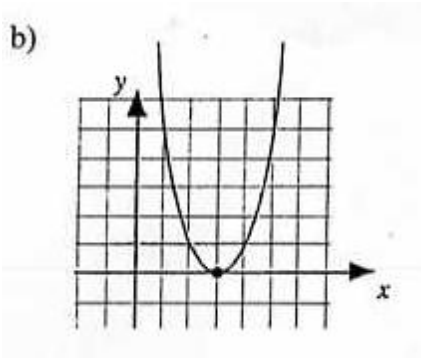
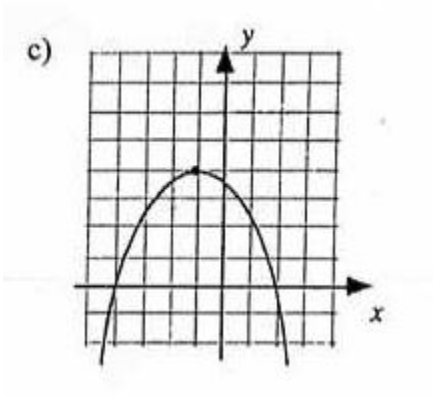
Exercise 10

Sketching Quadratics

1. Write down the equation representing each parabola.
(Each one is in the form $y = kx^2$ or $y = (x+a)^2 + b$ **(4)**







2. Sketch the graph of the following quadratic functions showing where it cuts both the x and the y axis and also the coordinates of the turning point.

(a) $y = (x+4)(x-2)$ (b) $y = x^2 + 6x - 16$ **(9)**

3. Sketch the graph of the following quadratic functions showing where it cuts the y axis and also the coordinates of the turning point.

(a) $y = 10 - (x+2)^2$ (b) $y = x^2 + 10x - 4$ *Hint: complete the square first **(8)**

4. For each of the quadratic functions write down:-
(i) The coordinates of the turning point and its nature
(ii) The equation of the axis of symmetry.

(a) $y = (x+6)^2 - 4$ (b) $y = 12 - (x-3)^2$ **(6)**