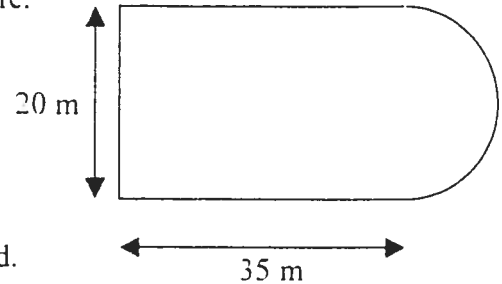1. A field is in the shape of a rectangle with a semi-circle on one side, as shown.

    To fence around the field costs £1.25 per metre.

    Seed potatoes cost 15p per square metre ground.

    (a) Calculate the cost of fencing the field.

    (b) Calculate the cost of seed potatoes needed.

    (c) After lifting potatoes the farmer can sell 120 bags of potatoes at £2.50 for each bag.
        How much profit does the farmer make on the potatoes ?

    (d) Express this profit as a percentage of the cost of seed potatoes.

    (e) Has the farmer made enough money to cover the cost of seed potatoes and fencing ?
        Express his overall profit or loss as a % of his total outlay.

    Answers to (d) and (e) correct to 3 significant figures.

2. An oil drum is in the shape of a cylinder which is 1.2 m tall and has diameter 55 cm.

    (a) How many litres of oil does it hold ?

    (b) What amount of metal is required to manufacture the oil drum ?

    Give answers correct to 2 significant figures.

3. Solve the following equations :-

    (a) $4x - 20 = 15 - 3x$ (b) $3(2x + 4) = 2(x - 4)$

    (c) $2(3 - x) = 4 - (2 - 4x)$ (d) $\dfrac{3x}{5} - \dfrac{x}{4} = \dfrac{7}{10}$

4. A triangle has a base twice its height. The area of the triangle is $36\,m^2$.
    Make a sketch of the triangle, form an equation and solve it to find the base length and height of the triangle.

5. Copy each sequence and continue for the next 3 terms.
   Find, also, the n'th term for each sequence.

   (a) 3, 7, 11, 15, 19, . . .   (b) -3, 3, 9, 15, 21, . . .

   (c) 4, 7, 12, 19, . . .

6. The border between two gardens is marked by a fence made with posts, P, and chains, C, in the pattern shown :-

Number of Posts, P	2	3	4	5	6		20
Number of Chains, C	2	4	6				

(a) Copy and complete the table.

(b) Write a formula which calculates the number of chains, C, if we know the number of posts, P.

(c) How many chains are needed if 50 posts are used ?

(d) How many posts could you join if you had 146 chains ?

7. In a shop sale videos cost £6 each and DVD's are £10 each.

(a) Mairi buys 5 videos and 4 DVD's. How much did she pay in total ?
   Show careful working.

(b) Write a formula for the total cost, £C, if you buy x videos and y DVD's.

1 (a) Perimeter $= 20 + 2 \times 35m + \frac{1}{2}\pi d$

$= 90m + \frac{1}{2} \times 3.14 \times 20m$

$= 90 + 31.4m$

$= 121.4m$

Cost of fencing $= 121.4 \times £1.25$

$= £151.75$

(b) Area $= 20 \times 35 + \frac{1}{2}\pi r^2$

$= 700 m^2 + \frac{1}{2} \times 3.14 \times 10^2$

$= 857 m^2$

Cost of potatoes $= 857 \times £0.15$

$= £128.55$

(c) Selling Price $= 120 \times £2.50$

$= £300$

Profit on potatoes $= £300 - £128.55$

$= £171.45$

(d) % Profit $= \frac{171.45}{128.55} \times \frac{100}{1} \%$

$= 133.4\%$ (to 1 d.p.) $= 133\%$ (to 3 s.f.)

(e) Cost of seed + fencing $= £280.30$

Yes, overall profit of $£300 - £280.30$

$= £19.70$

% overall profit $= \frac{19.70}{280.30} \times \frac{100}{1} \%$

$= 7.03\%$ (to 3 s.f.)

2 (a) $V = \pi r^2 h$

$\quad = 3.14 \times 27.5 \times 27.5 \times 120 \quad cm^3$

$\quad = 284\,955 \; cm^3 \; (285099\,cm^3)$

$\quad = \underline{284.96 \; Litres} \; (to \; 2 \; d.p) = \underline{280L} \; (to \; 2\,s.f)$

$\qquad \overline{285.099 \; Litres} \qquad \qquad \qquad \overline{290\,L}$

(b) Surface Area $= 2\pi r^2 + 2\pi r h$

$\quad = 2 \times 3.14 \times 27.5^2 \quad + \quad 2 \times 3.14 \times 27.5 \times 120$

$\quad = 4749.25 \; cm^2 \quad + \quad 20724 \; cm^2$

$\quad = \underline{\underline{25\,473.25 \; cm^2}}$

$\quad = \underline{\underline{25\,000 \; cm^2}} \; (to \; 2\,s.f)$

3 (a) $4x - 20 = 15 - 3x$

$\qquad 7x = 35$

$\qquad x = \underline{\underline{5}}$

(b) $3(2x + 4) = 2(x - 4)$

$\qquad 6x + 12 = 2x - 8$

$\qquad 4x = -20$

$\qquad x = \underline{\underline{-5}}$

(c) $2(3 - x) = 4 - (2 - 4x)$

$\qquad 6 - 2x = 4 - 2 + 4x$

$\qquad -6x = -4$

$\qquad x = \underline{\underline{\dfrac{2}{3}}}$

(d) $\dfrac{3x}{5} - \dfrac{x}{4} = \dfrac{7}{10}$

$\quad 20 \times \dfrac{3x}{5} - 20 \times \dfrac{x}{4} = 70 \times \dfrac{7}{10}$

$\qquad 12x - 5x = 14$

$\qquad \qquad 7x = 14$

$\qquad \qquad x = \underline{\underline{2}}$

4

$2x$
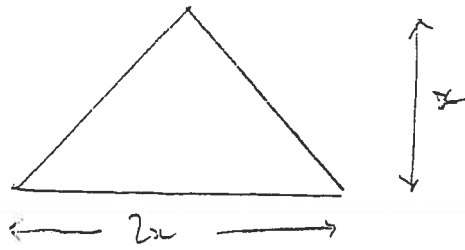
Let height be x cm

$$\text{Area} = \frac{1}{2}bh$$
$$= \frac{1}{2} \times 2x \times x$$
$$= x^2$$

but Area $= 36$ cm^2
$$\Rightarrow x^2 = 36$$
$$x = 6$$

length $= 12$ cm
height $= 6$ cm

5 (a) 3, 7, 11, 15, 19, <u>23</u>, <u>27</u>, <u>31</u> n^{th} term $= 4n - 1$

(b) -3, 3, 9, 15, 21, <u>27</u>, <u>33</u>, <u>39</u> n^{th} term $= 6n - 9$

(c) 4, 7, 12, 19, <u>28</u>, <u>39</u>, <u>52</u> n^{th} term $= n^2 + 3$

6 (a)

P	2	3	4	5	6		20
C	2	4	6	<u>8</u>	<u>10</u>		<u>38</u>

(b) $C = 2P - 2$

(c) $C = 2P - 2$, $P = 50$
$$= 2 \times 50 - 2$$
$$= 98$$

(d) $C = 146 \Rightarrow 2P - 2 = 146$
$$2P = 148$$
$$P = \underline{74} \text{ posts needed}$$

7 (a) Cost $= 5 \times £6 + 4 \times £10$
$$= £30 + £40$$
$$= \underline{£70}$$

(b) $C = 6x + 10y$