1.

(a) Work out $(4.5 \times 10^5) + (3.26 \times 10^4)$. Give your answer in standard form.

$$\begin{array}{r} 450000 \\ + 32600 \\ \hline 482600 \end{array}$$

$$4.826 \times 10^5$$

(2)

(b) Work out $(1.5 \times 10^7) \div (5 \times 10^9)$. Give your answer in standard form.

$$1.5 \div 5 = 0.3$$
$$10^7 \div 10^9 = 10^{-2}$$

$$0.3 \times 10^{-2} = 3 \times 10^{-3}$$

(3)

2.

120 people were asked how many pets they have.
The results are shown in the frequency table below.

Number of pets	Frequency
0	17
1	2x $= 54$
2	x $= 27$
3	16
4	6

Find the mean number of pets that the people have.

$$17 + 2x + x + 16 + 6 = 120$$
$$3x + 39 = 120$$
$$-39 \qquad\qquad -39$$
$$3x = 81$$
$$\div 3 \qquad\qquad \div 3$$
$$x = 27$$

$$\begin{array}{r} 54 \\ 54 \\ 48 \\ + 24 \\ \hline 180 \\ {\scriptstyle 2} \end{array}$$

Total pets $= 54 + (27 \times 2) + (16 \times 3) + (4 \times 6)$
$$= 54 + 54 + 48 + 24$$
$$= 180$$

Mean $= 180 \div 120 = \underline{1.5}$

(5)

3.

Expand and simplify: $(\sqrt{2} + 4)(3 - 2\sqrt{2})$

$$3\sqrt{2} + 12 - 4 - 8\sqrt{2}$$

$$= \underline{8 - 5\sqrt{2}}$$

(2)

4.

Prove that the sum of two consecutive odd numbers is always a multiple of 4.
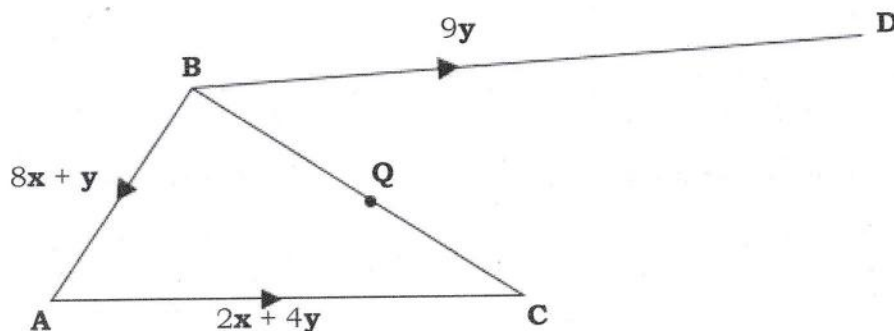
$$2n + 1 + 2n + 3 = 4n + 4$$

$$= 4(n+1)$$

therefore it is always a multiple of 4.

(3)

5.

ABC is a triangle.

Q is the point on BC such that BQ : QC = 3 : 2.

Show that AQD is a straight line.

$$\vec{BC} = 8x + y + 2x + 4y$$

$$= 10x + 5y$$

$$\vec{BQ} = \frac{10x + 5y}{5} \times 3 = 6x + 3y$$

$$\vec{AQ} = \vec{AB} + \vec{BQ} = -8x - y + 6x + 3y = 2y - 2x$$

$$\vec{QD} = \vec{QB} + \vec{BD} = -6x - 3y + 9y = 6y - 6x = 3(2y - 2x)$$

$$\vec{QD} = 3 \times \vec{AQ} \text{ therefore } AD \text{ and } AQ \text{ are parallel}$$
and AQD is a straight line.

(5)