

1) Expand and simplify:

a)  $(x + 4)(x + 7)$

[4]

$$x^2 + 11x + 28$$

b)  $(x + 8)(x - 9)$

$$x^2 - x - 72$$

c)  $(4x + 1)(3x - 5)$

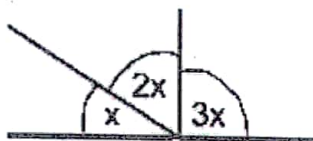
$$12x^2 - 17x - 5$$

d)  $(2x + 5)^2$

$$(2x + 5)(2x + 5) = 4x^2 + 20x + 25$$

2) I) Three angles made up a straight line

[3]



a) Form an equation in x

$$3x + 2x + x = 180$$

$$6x = 180$$

b) Solve the equation for x

$$x = \frac{180}{6}$$

$$x = 30$$

II) Rewrite  $16 = 4x + 8y$ . Make y the subject

$$16 - 4x = 8y$$

$$\frac{16 - 4x}{8} = y$$

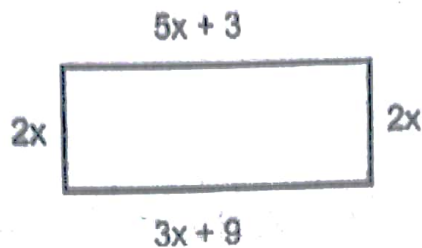
$$y = \frac{4 - x}{2}$$

or

$$y = -\frac{1}{2}x + 2$$

3) The diagram shows a rectangle, the sides are measured in cm.

[2]



a) Write an expression for the perimeter of the rectangle.

$$P = 12x + 12$$

b) If  $x = 2$  cm, find the perimeter of the rectangle.

$$P = 12(2) + 12$$

$$P = 36 \text{ cm}$$

4) Anas is  $x$  years old, Lili is  $x - 3$  year younger than Anas.

Saif is twice as old as Anas.

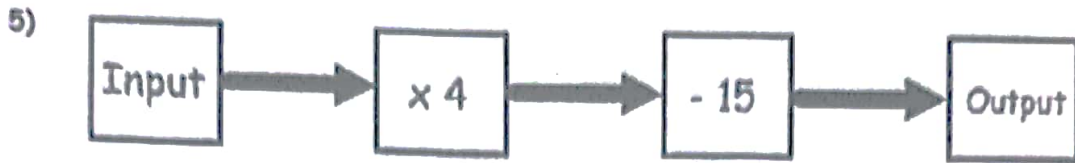
[2]

a) Write an expression for Lili's age.

$$x - 3$$

b) Write an expression for the sum of the three ages.

$$x + x - 3 + 2x = 4x - 3$$



a) Work out the output if the input is 12

[2]

$$(12 \times 4) - 15 = \boxed{33}$$

b) Write an expression of the output if the input is y

$$\boxed{4y - 15}$$

6) Simplify:

a)  $\frac{m^9 \times m^1}{m^5} = \frac{m^{10}}{m^5}$

$$\boxed{m^5}$$

[6]

b)  $w^3 \times w^{-5} = w^{3-5} = w^{-2} =$

$$\boxed{\frac{1}{w^2}}$$

c)  $a^4 \div a^{-2} = a^{4 \oplus (-2)} = a^{4+2} =$

$$\boxed{a^6}$$

d)  $(2m^4)^3 = (2^3)(m^4)^3 =$

$$\boxed{8m^{12}}$$

e)  $2a^3c^3 \times 3a^2c^1 =$

$$\boxed{6a^5c^4}$$

f)  $\frac{10m^5n^4}{2m^2n^1} =$

$$\boxed{5m^3n^3}$$

7) a) Solve and simplify  $\frac{v+3}{2} + \frac{2v+1}{5}$  [3]

$$\frac{5(v+3) + 2(2v+1)}{10} = \frac{5v+15+4v+2}{10} = \frac{9v+17}{10}$$

b) If  $x = 6$  and  $y = -2$ , find the value of :

i)  $y + x^2 = -2 + 36 = 34$

ii)  $\frac{y+20}{x} = \frac{-2+20}{6} = \frac{18}{6} = 3$

8) a) Write in standard form 35000  $3.5 \times 10^4$  [4]

b) Write as an ordinary number  $1.2 \times 10^3 = 1.2 \times 1000 = 1200$

c) Write as an ordinary number  $4.7 \times 10^{-2} = 4.7 \div 100 = 0.047$

d) Write in standard form 0.0000549  $= 5.49 \times 10^{-5}$

9) Write these numbers in order of size, smallest to largest.

$2.04 \times 10^3$	250	$0.3 \times 10^3$	$4 \times 10^{-2}$ (4 ÷ 10 <sup>2</sup> )	[2]
2040	250	300	0.04	

The order is:  $4 \times 10^{-2}$ , 250,  $0.3 \times 10^3$ ,  $2.04 \times 10^3$

10) Solve the equations:

[3]

a)  $6(y-7) = 30$

$$6y - 42 = 30$$

$$6y = 72$$

$$y = \frac{72}{6}$$

$$y = \boxed{12}$$

b)  $15 = 40 - 5y$

$$15 - 40 = -5y$$

$$-25 = -5y$$

$$y = \frac{-25}{-5}$$

$$y = \boxed{5}$$

c)  $5(x+5) + 3(x-2) = 3$

$$5x + 25 + 3x - 6 = 3$$

$$8x + 19 = 3$$

$$8x = 3 - 19$$

$$8x = -16$$

$$x = -2$$

$$x = \boxed{-2}$$

11) A whole number is rounded to the nearest 10, the answer is 80.

a) List the integer values the number could be.

[3]

75, 76, 77, 78, 79, 80, 81, 82, 83, 84

b) What is the lower bound?

$\boxed{75}$

c) What is the upper bound?

$\boxed{84}$

- 12) The rectangular cards show percentage increases and decreases.  
The oval cards show multipliers.

[5]

Match each rectangular card with the correct oval card.

The first one has been done for you: A and vi.

$$100 + 10 = 110$$

$$\boxed{1.10}$$

vi

A - increase by 10%

B increase by 40%

C decrease by 25%

D decrease by 5%

E increase by 4%

F decrease by 62%

i 0.75

ii 1.04

iii 1.4

iv 0.95

v 0.38

vi 1.1

B →  $100 + 40 = 140\% \rightarrow 1.4 \rightarrow \boxed{iii}$

C →  $100 - 25 = 75\% \rightarrow 0.75 \rightarrow \boxed{i}$

D →  $100 - 5 = 95\% \rightarrow 0.95 \rightarrow \boxed{iv}$

E →  $100 + 4 = 104\% \rightarrow 1.04 \rightarrow \boxed{ii}$

F →  $100 - 62 = 38\% \rightarrow 0.38 \rightarrow \boxed{v}$

- 13) 30% increase then 25% decrease, work out the multiplier of this compound percentage.

[1]

$$100 + 30$$

$$= 130\%$$

$$= 1.3$$

$$100 - 25$$

$$= 75\%$$

$$= 0.75$$

$$\boxed{0.975}$$

$$1.3 \times 0.75 =$$