

Section II – Measurement (23 marks)

NAME: _____

CLASS: _____

1.
2. Convert the following units. [2]

a) $50^{\circ}24' =$ _____ degrees

b) $2.3\text{m}^2 =$ _____ cm^2

3. The water from a flat rectangular roof $12\text{m} \times 15\text{m}$ is collected in a cylindrical water tank of diameter 2.2m .

- a) If 10mm of rain falls on the roof, find the [1] volume of water which has fallen on the roof.

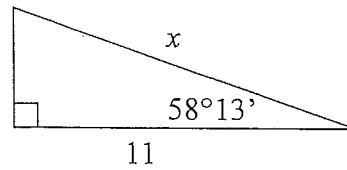
- b) What is the rise in the water level of the tank when this volume of water is collected? (nearest cm) [2]

- c) The cylindrical water tanks is 1.5m high. The curved part of the tank is to be painted with rust proofing. What is the area to be painted to the nearest m^2 ? [2]

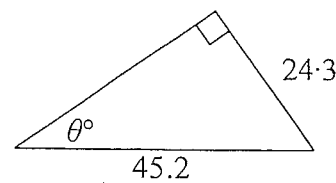
4. Answer each of the following.

- a) Given $\tan \theta = \frac{26.1}{8.7}$, find θ to the nearest minute. [1]

- b) Find x to 1 decimal place. [2]



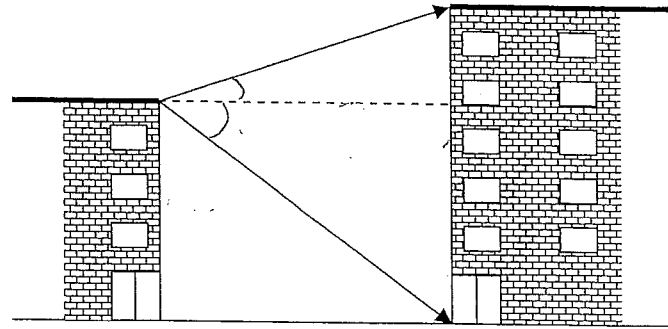
- c) Find θ to the nearest degree. [2]



5. If $\sin \theta = \frac{1}{4}$, find the exact value of $\cos \theta$. [2]

6. An observer, from the top of a building 66 metres high, finds the angle of elevation of the top of a taller building to be 34° . The angle of depression of the foot of the same building is 51° .

a) Mark all the given information on the diagram given below. [1]

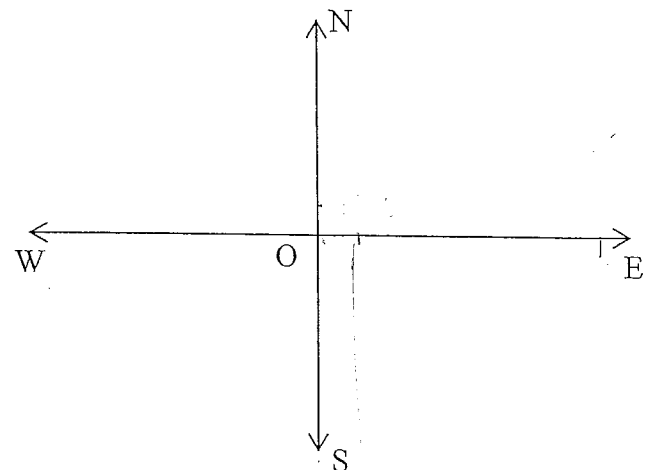


b) (i) Find the distance between the two buildings. to the nearest m [2]

(ii) Find the height of the taller building. [2]

7. A ship leaves port O and travels 380km on a bearing of 145° to port A.

a) Put this information on the diagram. [1]



b) How far East of port O is port A? [2]

Answer to the nearest km

c) What is the bearing of O from A? [1]

Answer to the nearest degree

Section III – Algebra (43 marks)

NAME: _____

CLASS: _____

1. Simplify $9p - 3p \times 2$. [1]

2. Expand and simplify $(5g + 3)(4g - 1) - (g + 2)(g - 2)$. [2]

3. If $y = 7 + 5(4 - x)$, find x , when $y = 0$. [2]

4. Solve $\frac{2x + 3}{3} - \frac{3x + 1}{4} = 2$. [3]

5. Solve $4 - 3x \leq 9$. [1]

6. Use an equation to solve this problem.
 "A number is increased by 5 and then trebled.
 The result is 6 more than two thirds of the
 number. Find the number". [3]

7. The velocity of an object is given by $v^2 = u^2 + 2as$. Find u when $v = 13$, $a = 6$ and $s = 12$. [1]

8. For the points A (3, -1) and B (-5, 0), find...

a) The gradient of AB. [1]

b) The distance AB. [1]

c) The midpoint of AB. [1]

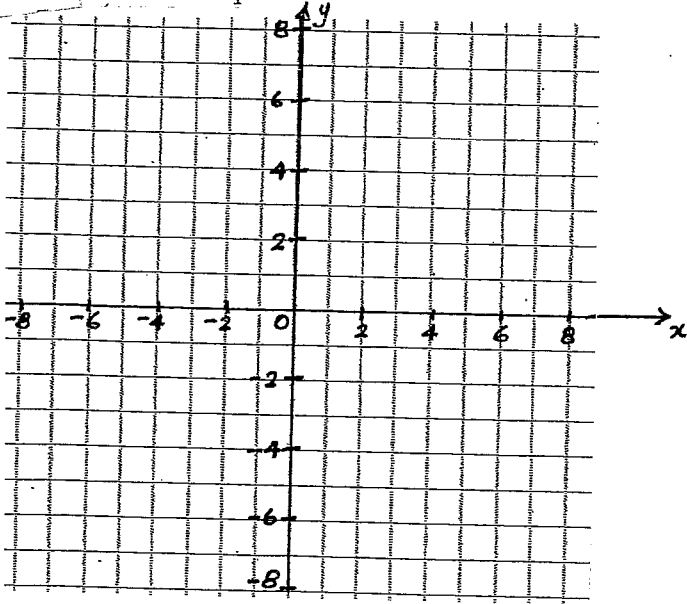
d) The equation of the line which passes through A and B. Give your answer in general form. [3]

e) Where does the line AB cross the x -axis? [1]

f) Find the equation of the line parallel to AB which also passes through the point (0, 8). [2]

9. Find k if $2x + ky = 5$ is perpendicular to $x - 3y = 11$. [2]

10. On the number plane below...



a) Sketch $2x + y = 6$. [1]

b) Hence shade the region where $2x + y \leq 6$. [1]

c) Clearly indicate on the number plane [3]
the region where $2x + y \leq 6$ and $x < 4$
are both true.

11. Factorise fully...

a) $xp + 2x - yp - 2y$ [1]

b) $x^2 - 5x - 6$ [1]

c) $5x^2 + 7x - 6$ [1]

d) $2x^3 - 18x$ [2]

12. Simplify...

a) $\frac{2a^2x}{5} \times \frac{10}{4ax^2}$ [1]

b) $\frac{x-2}{3x^2-6x}$ [2]

c) $\frac{x^2-25}{3x^2+15x} \div \frac{x^2-4x-5}{x^2+x}$ [3]

d) $\frac{2}{x^2-x} - \frac{3}{x^2-1}$ [3]

END of EXAMINATION

Section II – Measurement (23 marks)

1. Convert the following units. [2]

a) $50^{\circ}24' = 50.4$ degrees

b) $2.3\text{m}^2 = 23\ 000$ cm^2

3. The water from a flat rectangular roof $12\text{m} \times 15\text{m}$ is collected in a cylindrical water tank of diameter 2.2m .

a) If 10mm of rain falls on the roof, find the [1] volume of water which has fallen on the roof.

$1200\text{cm} \times 1500\text{cm} \times 1\text{cm}$
 $= 1800\ 000\ \text{cm}^3$
 $= 1800\ \text{L}$

b) What is the rise in the water level of the tank when this volume of water is collected? (nearest cm) [2]

$1800\ \text{cm} = 18\text{m}$

$V = \pi r^2 h$
 $1.8\text{m}^3 = \pi \times 1.1^2 \times h$

c) The cylindrical water tanks is 1.5m high. The curved part of the tank is to be painted with rust proofing. What is the area to be painted to the nearest m^2 ? [2]

$2 \times \pi \times 1.1 \times 1.5$
 $= 10\ \text{m}^2$ (nearest m^2)

4. Answer each of the following.

a) Given $\tan \theta^{\circ} = \frac{26.1}{8.7}$, find θ° to the nearest minute. [1]

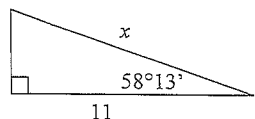
$\theta^{\circ} = 71^{\circ}34'$ (nearest minute)

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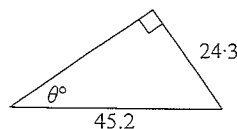
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b) Find x to 1 decimal place. [2]



$\cos 58^{\circ}13' = \frac{11}{x}$
 $x = \frac{11}{\cos 58^{\circ}13'}$
 $= 20.9$ (1 dec. pl)

c) Find θ° to the nearest degree. [2]



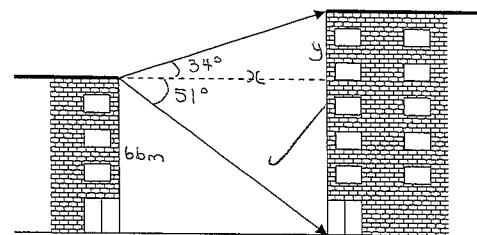
$\sin \theta = \frac{24.3}{45.2}$
 $\theta = 33^{\circ}$ (nearest degree)

5. If $\sin \theta = \frac{1}{4}$, find the exact value [2]

of $\cos \theta$.
 $\sqrt{4^2 - 1^2} = \sqrt{16 - 1}$
 $= \sqrt{15}$
 $\therefore \cos \theta = \frac{\sqrt{15}}{4}$

6. An observer, from the top of a building 66 metres high, finds the angle of elevation of the top of a taller building to be 34° . The angle of depression of the foot of the same building is 51° .

a) Mark all the given information on the diagram given below. [1]



b) (i) Find the distance between the two buildings to the nearest m [2]

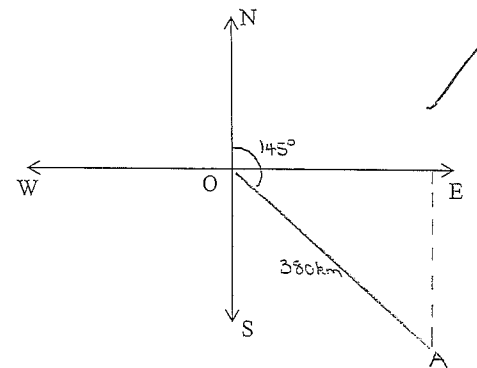
$\tan 51^{\circ} = \frac{66}{x}$
 $x = \frac{66}{\tan 51^{\circ}}$
 $= 53\ \text{m}$ (nearest m)

(ii) Find the height of the taller building. [2]

$\tan 34^{\circ} = \frac{y}{53}$
 $y = \tan 34^{\circ} \times 53$
 $= 35.75\text{m}$ (2 dec. pl.)
 $66\text{m} + 35.75\text{m} = 101.75\text{m}$ (2 dec. pl.)

7. A ship leaves port O and travels 380km on a bearing of 145° to port A.

a) Put this information on the diagram. [1]



b) How far East of port O is port A? [2]

Answer to the nearest km
 $\cos 55^{\circ} = \frac{x}{380}$
 $x = \cos 55^{\circ} \times 380$
 $= 218\ \text{km}$ (nearest km)

c) What is the bearing of O from A? [1]

Answer to the nearest degree
 $\angle OAE = 180^{\circ} - 90^{\circ} - 55^{\circ} = 35^{\circ}$
 \therefore Bearing of O from A is 325° or $N35^{\circ}W$

Section III - Algebra (43 marks)

1. Simplify $9p - 3p \times 2$. [1]

$$= 9p - 6p$$

$$= 3p$$

2. Expand and simplify $(5g+3)(4g-1) - (g+2)(g-2)$. [2]

$$= (20g^2 - 5g + 12g - 3) - (g^2 - 2g + 2g - 4)$$

$$= (20g^2 + 7g - 3) - (g^2 - 4)$$

$$= 20g^2 + 7g - 3 - g^2 + 4$$

$$= 19g^2 + 7g + 1$$

3. If $y = 7 + 5(4 - x)$, find x , when $y = 0$. [2]

$$0 = 7 + 20 - 5x$$

$$0 = 27 - 5x$$

$$5x = 27$$

$$x = \frac{27}{5} = 5\frac{2}{5}$$

4. Solve $\frac{2x+3}{3} - \frac{3x+1}{4} = 2$. [3]

$$= \frac{4(2x+3) - 3(3x+1)}{12} = 2$$

$$8x + 12 - 9x - 3 = 24$$

$$-x + 9 = 24$$

$$-x = 15$$

$$x = -15$$

5. Solve $4 - 3x \leq 9$. [1]

$$-5 \leq 3x$$

$$3x \geq -5$$

$$x \geq -1\frac{2}{3}$$

6. Use an equation to solve this problem. "A number is increased by 5 and then trebled. The result is 6 more than two thirds of the number. Find the number". [3]

$$3(x+5) = \frac{2}{3}x + 6$$

$$3x + 15 = \frac{2}{3}x + 6$$

$$9x + 45 = 2x + 18$$

$$7x = -27$$

$$x = -\frac{27}{7}$$

$$= -3\frac{6}{7}$$

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7. The velocity of an object is given by $v^2 = u^2 + 2as$. Find u when $v = 13$, $a = 6$ and $s = 12$. [1]

$$13^2 = u^2 + (2 \times 6 \times 12)$$

$$169 = u^2 + 144$$

$$u = \sqrt{25} = 5 \text{ or } -5$$

8. For the points A (3, -1) and B (-5, 0), find...

a) The gradient of AB. [1]

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{0 - (-1)}{-5 - 3} = \frac{1}{-8} = -\frac{1}{8}$$

b) The distance AB. [1]

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$d = \sqrt{(-5 - 3)^2 + (0 - (-1))^2}$$

$$= \sqrt{(-8)^2 + 1^2} = \sqrt{64 + 1} = \sqrt{65} \text{ units}$$

c) The midpoint of AB. [1]

$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$M = \left(\frac{3 + (-5)}{2}, \frac{(-1) + 0}{2} \right) = \left(\frac{-2}{2}, \frac{-1}{2} \right) = \left(-1, -\frac{1}{2} \right)$$

d) The equation of the line which passes through A and B. Give your answer in general form. [3]

$$y = mx + b$$

$$-1 = \left(3x - \frac{1}{8}\right) + b$$

$$-1 = -\frac{3}{8} + b$$

$$b = -\frac{5}{8}$$

$$y = \left(-\frac{1}{8}\right)x - \frac{5}{8}$$

e) Where does the line AB cross the x-axis? [1]

$$-\frac{5}{8} \sqrt{\text{cfpe}}$$

f) Find the equation of the line parallel to AB which also passes through the point (0, 8). [2]

$$y = mx + b$$

$$8 = 0 + b$$

$$b = 8$$

$$\therefore y = -\frac{1}{8}x + 8$$

9. Find k if $2x + ky = 5$ is perpendicular to $x - 3y = 11$. [2]

$$ky = 5 - 2x$$

$$y = \frac{5}{k} - \frac{2}{k}x$$

$$3y = x - 11$$

$$y = \frac{1}{3}x - \frac{11}{3}$$

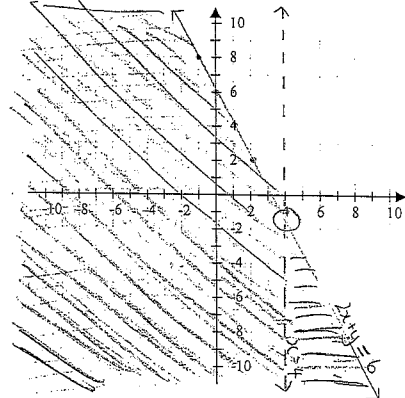
$$-\frac{2}{3k} = -1$$

$$\frac{2}{3k} = 1$$

$$2 = 3k$$

$$k = \frac{2}{3}$$

10. On the number plane below...



a) Sketch $2x + y = 6$. [1]

$$-1 = (3x - \frac{1}{8}) + b$$

b) Hence shade the region where $2x + y \leq 6$. [1]

Region = [shaded area]

c) Clearly indicate on the number plane the region where $2x + y \leq 6$ and $x < 4$ are both true. [3]

Region = [shaded area]

11. Factorise fully...

a) $xp + 2x - yp - 2y$ [1]

$$= (x - y)(p + 2)$$

b) $x^2 - 5x - 6$ [1]

$$= (x + 1)(x - 6)$$

c) $5x^2 + 7x - 6$ [1]

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

d) $2x^3 - 18x$ [2]

$$= 2x(x^2 - 9)$$

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

12. Simplify...

a) $\frac{8a^2x \times 10^2}{5 \times 4a^2x}$ [1]

$$= \frac{80a^2x}{20a^2x} = 4$$

b) $\frac{x - 2}{3x^2 - 6x}$ [2]

$$= \frac{x - 2}{3x(x - 2)}$$

$$= \frac{1}{3x}$$

c) $\frac{x^2 - 25}{3x^2 + 15x} + \frac{x^2 - 4x - 5}{x^2 + x}$ [3]

$$= \frac{(x + 5)(x - 5)}{3x(x + 5)} + \frac{(x - 5)(x + 1)}{x(x + 1)}$$

$$= \frac{(x - 5)}{3x} + \frac{(x - 5)}{x}$$

$$= \frac{1}{3}$$

d) $\frac{2}{x^2 - x} - \frac{3}{x^2 - 1}$ [3]

$$= \frac{2}{x(x - 1)} - \frac{3}{(x + 1)(x - 1)}$$

$$= \frac{2(x + 1) - 3x}{x(x + 1)(x - 1)}$$

$$= \frac{2x + 2 - 3x}{x(x + 1)(x - 1)}$$

$$= \frac{-x + 2}{x(x + 1)(x - 1)}$$

END of EXAMINATION