

Number

$$A \rightarrow 13$$

$$M \rightarrow 5$$

$$E \rightarrow 1$$

CARNIVAL

$$A \rightarrow 7A$$

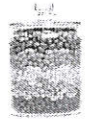
$$M \rightarrow 7A + 3M$$

$$E \rightarrow 7A + 3M + 1E$$

QUESTION ONE

- (a) $\frac{3}{7} + \frac{2}{9} =$ $\frac{41}{63}$ (A)
- (b) $\frac{1}{9}$ of 300 = $\frac{100}{3}$ or 33.33 (A)
- (c) $-6 + 20 \div -4 =$ -11 (A)
- (d) 10% of 150 = 15 (A)

QUESTION TWO



One of the stalls at the show ran competitions to win a jar of lollies. The entry fee was \$1.50 and people had to guess the number of lollies in the jar.

- (a) 2150 people paid to guess the number of lollies in the jar. How much entry fee money was paid?

$$2150 \times 1.50 = \$ 2225 \quad (A)$$

- (b) The 800 lollies in the jar were coloured blue, green, yellow, orange and red. $\frac{1}{5}$ of the lollies were red. How many lollies were red?

$$\frac{1}{5} \text{ of } 800 = 160 \quad (A)$$

- (c) 244 of the lollies were blue. What percentage of the lollies were blue?

$$\frac{244}{800} \times 100 = 30.5\% \quad (A) \quad (A)$$

- (d) 17% of the lollies were green. How many lollies were green?

$$\frac{17}{100} \times 800 = 136 \quad (A) \quad (A)$$

(e) 260 lollies were either yellow or orange. The ratio of orange to yellow lollies is 2:3. How many orange lollies were in the jar?

$$\frac{2}{5} \times 260 = 104$$

(M)

QUESTION THREE

The Haunted House attraction at the carnival was very popular.



(a) The number of people entering the house in 2016 was 20% more than the 3450 people who entered the house in 2015. How many people entered the house in 2016?

$$1.20 \times 3450 = 4140.$$

(M)

(b) The ticket price for the Haunted House was \$4.50 including GST. Calculate the GST exclusive price.

$$\frac{4.50}{1.15} = \$3.91$$

(M)

QUESTION FOUR

There is a competition for the biggest Pumpkin at the Carnival.



(A) (A)

The weights of the five largest pumpkins are below:

5.22kg, 5.3kg, 5.67kg, 5.09 kg, 4.71 kg, 4.17kg

$$= 4.17, 4.71, 5.09, 5.22, 5.3, 5.67$$

(a) Order the weights of these pumpkins from smallest to largest.

(b) Add the weights together and round your answer to:

(i) One decimal place: 30.2 kg (A)

(ii) Two significant figures: 30 kg (A)

QUESTION FIVE

(a) The total amount of money spent at the carnival in 2016 was \$ 1, 754, 000. Write this amount in standard form.

1.754 × 10⁶ (A)

(b) $\frac{2}{5}$ of the money raised was donated to different charities.

Calculate the amount of money given to charities.

$\frac{2}{5} \times 1754000$
= \$701,600 (A)

(c) \$20 000 of the charity money was donated to the Salvation Army. What percentage of the charity money was given to the Salvation Army?

$\frac{20,000}{701,600} \times 100 = 2.85\%$ (M)

(d) In 2014 the amount of money spent at the carnival was $\$1.27 \times 10^5$ and in 2015 amount of money spent at the carnival was $\$9.09 \times 10^4$. Calculate the total amount of money spent at the carnival in 2014, 2015 and 2016.

1.754000 + 127000 + 90900. (M)
= 1,971,900

QUESTION SIX

Letisha works at the ticket office at the Carnival. She is paid \$15.75 an hour. (E)

For every 5 hours worked an unpaid half an hour meal break must be taken.

From Letisha's income, 18% tax and 2% Kiwi Saver is deducted

The Carnival is open seven days a week, from 10am until 10pm.

The Carnival runs for 6 weeks starting 1st December until the 12th January.

It is closed for Christmas day.

Letisha is working to save money for University. She needs to save \$6 500.

Will Letisha be able to save enough money for University?

You must show all calculations and state what you are calculating at each step.

1st of Dec - 12th Jan
= 43 days.

closed on chrt mxd day $43 - 1 = 42$ days.

No. of hours each day 12 - 1 hour lunch break
= 11 hours.

Total no. of hours worked in 6 weeks.

$$42 \times 11 = 462 \text{ hours.}$$

$$\text{Letisha's earning} = 462 \times 15.75 = 7276.50$$

$$\begin{array}{r} (-) \text{ 3\% Kiwi Saver} \\ \hline \end{array} = \quad -145.53$$

$$\begin{array}{r} - 18\% \text{ tax} \\ \hline \end{array} = \quad 1309.77$$

$$\hline 5821.20$$

she won't be able to save enough money

she is short of $6500 - 5821.20$

$$\underline{\$ 678.80}$$



$$\begin{aligned}
 A &= 10A \\
 m &= 10A + 9m \\
 E &= 10A + 9m + 3E
 \end{aligned}$$

Algebra

$$\begin{aligned}
 A &- 19 && - 10A \\
 m &- 15 && - 9m \\
 E &- 6 && - 3E
 \end{aligned}$$

QUESTION ONE

Simplify the following expressions

- (a) $5w + 3y + 2y + 6w =$ 11w + 5y A
- (b) $5y^2 - 6z + 7y^2 - 4z =$ 12y² - 10z A
- (c) $m \times m \times m \times m =$ m⁴ A
- (d) $3w^5 \times 6w^4 =$ 18w⁹ A
- (e) $(p^4)^5 =$ p²⁰ ~~m~~ A
- (f) $\frac{36x^7}{9x^5} =$ 4x² A
- (g) $\frac{6y^9 \cdot 5y^6}{3y^7} =$ 3 10y⁸ A

QUESTION TWO

Expand and simplify the following expressions:

- (a) $6(2x - 5) =$ 12x - 30 A
- (b) $3(2w - 6) - 7(w + 5) =$ 6w - 18 - 7w - 35 m
-w - 53
- (c) $(x + 4)(x - 2) =$ x² - 2x + 4x - 8 m
x² + 2x - 8

QUESTION THREE

Fully factorise the following expressions:

(a) $xy + xw = \underline{x(y+w)}$

A

(b) $6y - 36 = \underline{6(y-6)}$

A

(c) $24x^5y^6 - 32x^3y^2 = \underline{8x^3y^2(3x^2y^4 - 4)}$

M.

(d) $x^2 + 7x + 10 = \underline{(x+2)(x+5)}$

M

(e) $2x^2 - 8x - 24 = \underline{2(x^2 - 4x - 12)}$

M.

$= \underline{2(x-6)(x+2)}$

QUESTION FOUR

Solve the following equations

(a) $w - 3 = 10$

A

$\underline{\hspace{10em}}$ $w = \underline{13}$

(b) $3p + 5 = 11$

A

$\underline{\hspace{10em}}$ $p = \underline{2}$

(c) $\frac{x}{10} + 5 = 12$

A

$\underline{\hspace{10em}}$ $x = \underline{70}$

(d) $4p - 7 = 2(p+3)$

M

$\underline{4p - 7 = 2p + 6}$

$\underline{2p = 13}$

$\underline{\hspace{10em}}$ $p = \underline{\frac{13}{2}}$

(e) $(x+9)(x-2) = 0$

M.

_____ $x = 2$ or $x = -9$

(f) $x^2 + 11x + 30 = 0$

_____ $(x+5)(x+6) = 0$

M.

_____ $x = -5$ or $x = -6$

(g) $x^2 - 36 = 0$

A M

_____ $x = \pm 6$

QUESTION FIVE

The formula for the volume of a cone is:

$V = \frac{1}{3} \pi r^2 h$ v = volume r = radius

(a) Calculate the volume of a cone with a radius of 5cm and height 7cm

M

_____ 183.3 cm^2

(b) Rearrange the formula to make r the subject.

E

_____ $r = \sqrt{\frac{3V}{\pi h}}$

QUESTION SIX

An insurance salesman is paid \$500 a week plus \$50 commission for every insurance policy sold.

(a) Write an equation to represent the salesman's weekly pay. Use P = pay and C = commission.

_____ $P = 500 + 50C$

no. of policies

A

Use your equation to answer the following two questions:

(b) How much will the salesman be paid if he sells 7 policies next week?

\$ 850

A

(c) The salesman was paid \$1 050 last week. How many policies did he sell?

11

A

(d) Last month the salesman sold two more policies than the previous month. The product of the two months sales was 440. This information is represented by the equation below:

$$x(x + 2) = 440$$

Solve the equation and determine the amount of policies sold for each of last two months.

$$x^2 + 2x = 440$$

$$x^2 + 2x - 440 = 0$$

$$(x + 22)(x - 20) = 0$$

$$x = -22 \text{ or } x = 20$$

Ans 20, ~~22~~ and 22

E

QUESTION SEVEN

Give the next two terms in each of these patterns:

(a) 1, 7, 13, 19, 25

A

(b) 1, 4, 9, 16, 25

A

(c) 4, 11, 32, 95, 284, 851

M

(d) n , $(n + 2)$, $(n + 4)$, $n + 6$, $n + 8$

M

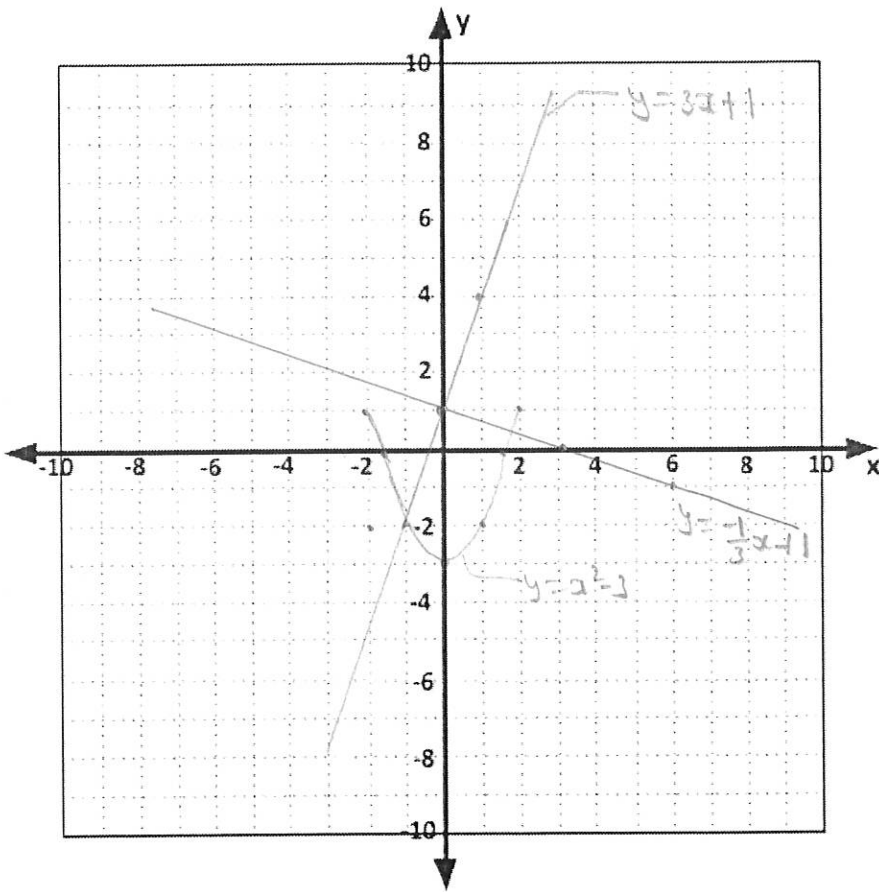
QUESTION EIGHT

Plot the following straight lines on the axes below. Remember to label each line.

(a) $y = 3x + 1$ M

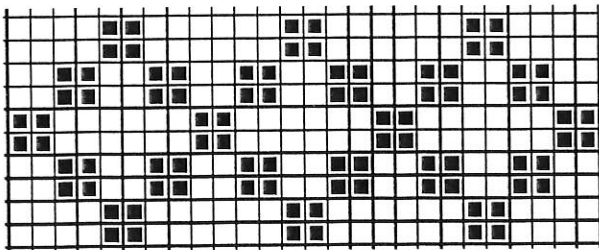
(b) $y = -\frac{1}{3}x + 1$ E

(c) $y = x^2 - 3$ E



QUESTION NINE

Below is a photograph of a simple cross stitch pattern of black diamonds.



Complete the table below

(a)

Number of Diamonds (D)	Number of black squares
1	32
2	60
3	88
4	
5	
6	
7	

(b) Write an equation that linking the number of blacks squares needed to the number of diamonds.

B = $28D + 4$ M

(c) If 20 diamonds were made, how many black squares were cross stitched?

564 A

(d) If the points in the table above were plotted and joined to make a straight line on a co-ordinate axes.

Describe what type of graph will it make.

Give 2 features of the graph

straight line with gradient 28
y-intercept: 4
x-intercept: $-\frac{1}{28}$

} any two M.

QUESTION NINE:

Pam was 30 years old when her daughter was 4 years old.

Now, some years later, her daughter is half Pam's age.

How old is her daughter now?

You must show at least one equation that is used in solving this problem.

$$P = 30, D = 4$$

after x years

$$\frac{1}{2}(P+x) = 4+x$$

$$30+x = P+2x$$

$$22 = x$$

$$\text{Current age of Daughter} = 4+22$$

$$= 26 \text{ years}$$

(E)

QUESTION TEN:

A bar of chocolate and 2 ice creams cost \$5.20

2 bars of chocolate and 1 ice cream cost \$3.80

What is the cost of 2 bars of chocolate and 2 ice creams?

$$\$6.00$$

(E)

You must show at least one equation that is used in solving this problem.

$$C + 2I = 5.20 \quad \text{--- (1)}$$

$$2C + I = 3.80 \quad \text{--- (2)}$$

$$\text{(1) } \times 2 \quad 2C + 4I = 10.40 \quad \text{--- (3)}$$

$$\text{(3)} - \text{(2)} \quad 3I = 6.60$$

$$I = 2.20$$

$$C = 5.20 - 4.40 = 0.80$$

$$2C + 2I = 2 \times 0.80 + 2 \times 2.20 = 6.00$$

OR

(1) + (2)

$$3C + 3I = 9.00$$

$$C + I = 3.00$$

$$2C + 2I = 6.00$$

$$A = 6A$$

$$M = 6A + 2m$$

$$E = 6A + 2m + 2E$$

$$A - 6 - 4$$

$$M - 3 - 2$$

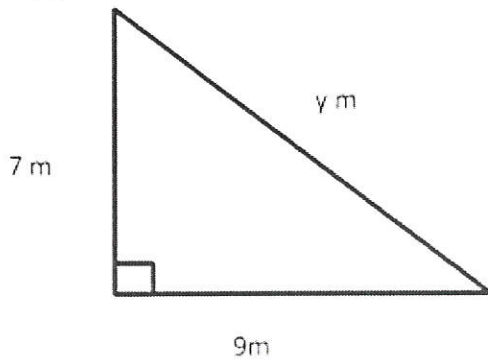
$$E - 3 - 2$$

Trigonometry

QUESTION ONE

Calculate the size of side y .

(a)



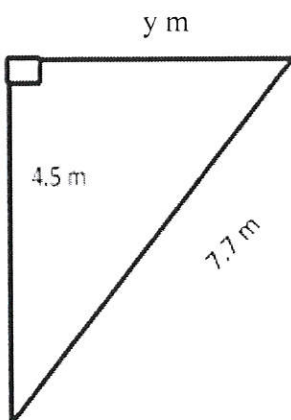
A

$$y^2 = 7^2 + 9^2$$

$$y = \sqrt{49 + 81}$$

$$11.4 \text{ m}$$

(b)



M

$$6.25 \text{ m}$$

QUESTION TWO

Calculate the values of x to 1 decimal place.

(a) $8^2 + 7^2 = x^2$

A

_____ 12.0

(b) $x^2 + 3.3^2 = 10.9^2$

A

_____ 10.4

(c) $x = 10 \sin 40$

A

_____ 6.4

(d) $\cos 40 = \frac{x}{9}$

A

_____ 6.9

(e) $\sin 30 = \frac{7}{x}$

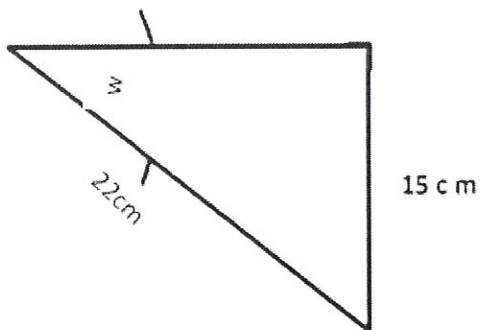
A

_____ 14.0

QUESTION THREE

Calculate the size of w

(a)

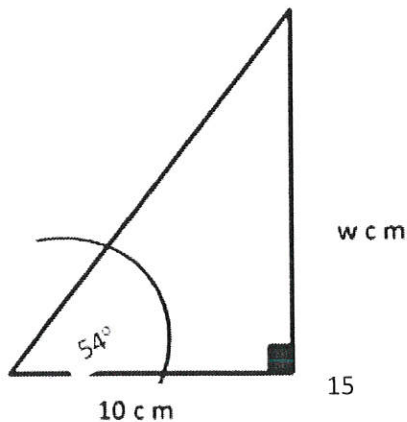


M

$\sin^{-1}(\frac{15}{22})$

_____ 43.0°

(b)



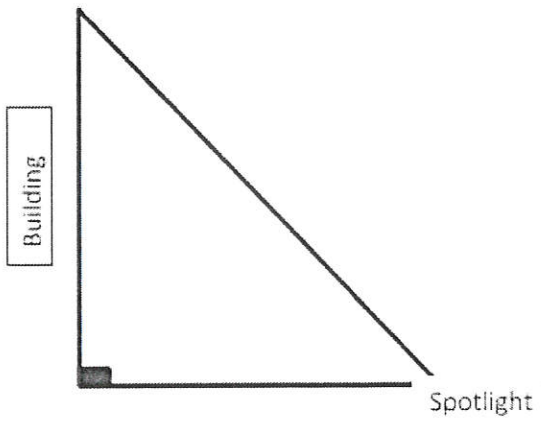
$\tan 54^\circ = \frac{w}{10}$
 $w = 10 \times \tan 54^\circ$

_____ 13.8 cm

M

QUESTION FOUR

The city council is installing coloured spotlights to light up an old building at night.
The building is 15m high and the lights will be placed 10m away from the base of the building.
Calculate the angle of elevation the lights need to be set at to shine at the top of the building.



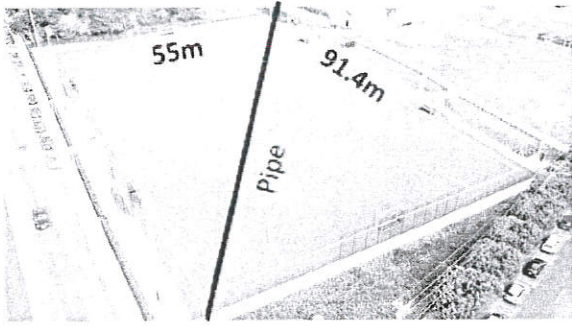
E

_____ $\tan^{-1} \left(\frac{15}{10} \right)$ _____

_____ 56.3° _____

QUESTION FIVE

A new water pipe needs to be installed across the Hockey turf.
Calculate the length of the pipe.



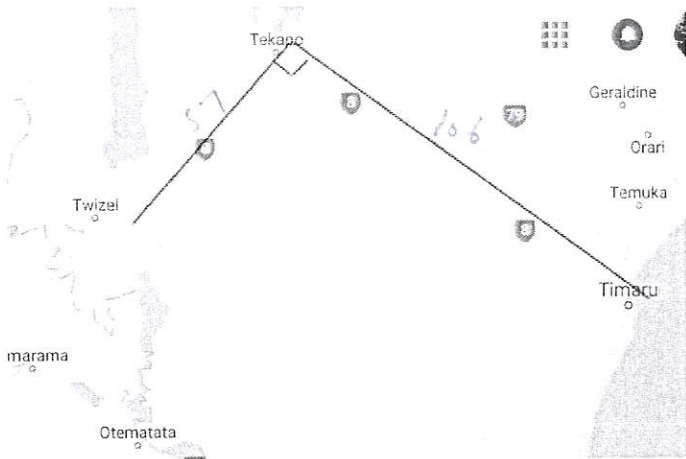
$$\sqrt{55^2 + 91.4^2}$$

$$106.7 \text{ m}$$

(E)

QUESTION SIX

The rescue helicopter is travelling from its base near Tekapo to a farm near Twizel then on to Timaru Hospital



The distance from Twizel to Tekapo is 57 km. the distance from Tekapo to timaru is 106 km.

(a) Calculate the distance the helicopter will fly from Twizel to timaru.

$$\sqrt{57^2 + 106^2} = 120.4 \text{ km}$$

$$57 + 120.4 = 177.4 \text{ km}$$

(E)

$$A = 3$$

$$m = 3A + 2m$$

$$E = 3A + 2m + 1E$$

$$A = 4$$

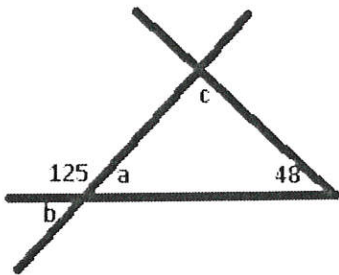
$$m = 3$$

$$E = 1$$

Geometry

QUESTION ONE

Calculate the size of each marked angle. Give a geometric reason for each answer.



$$a = 55^\circ$$

A

Reason Angle on a st. line

$$b = 55^\circ$$

A

Reason vertically opp angle

$$c = 77^\circ$$

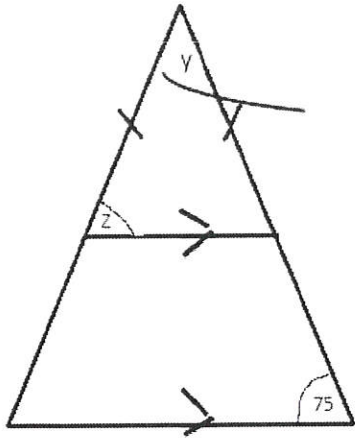
$$(180 - 55 - 48)$$

A

Reason Angle sum of a triangle is 180°

QUESTION TWO

Calculate the size of each marked angle. Give a geometric reason for each answer.



M

$z = 75^\circ$

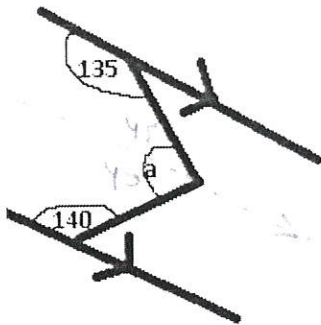
Reason Corresponding \angle s, Parallel line,
and base \angle s of an isosceles Δ are equal

~~Q~~

$y = 30^\circ$

Reason Base \angle s of isosceles Δ are equal
and angle sum of Δ is 180°

QUESTION THREE

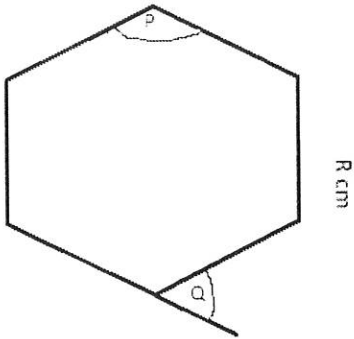


M

$a = 85^\circ$

Reason Co-interior \angle s \leftarrow Parallel line
add to 180°

QUESTION FOUR



(a) What is the name of this regular polygon?

A

Hexagon

(b) Give the sizes of P and Q

$P = 120^\circ$

M

Reason $(6-2) \times 180 = 720$ $\frac{720}{6} = 120^\circ$

$Q = 60^\circ$

Reason Sum of interior + exterior $\angle = 180^\circ$

OR

\angle s on st line

OR

Sum of exterior \angle s = 360° $\frac{360}{6} = 60^\circ$

E