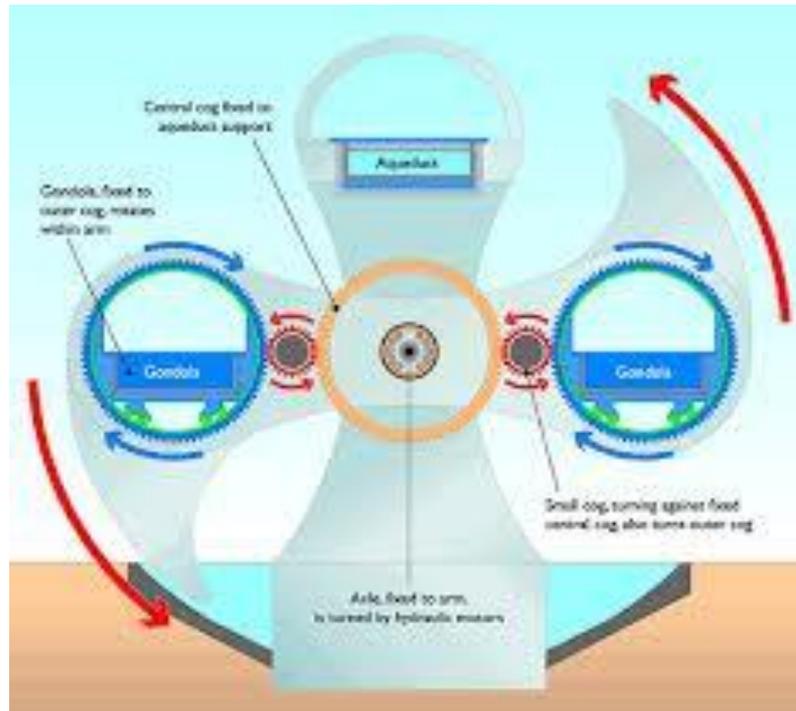


THE FALKIRK WHEEL

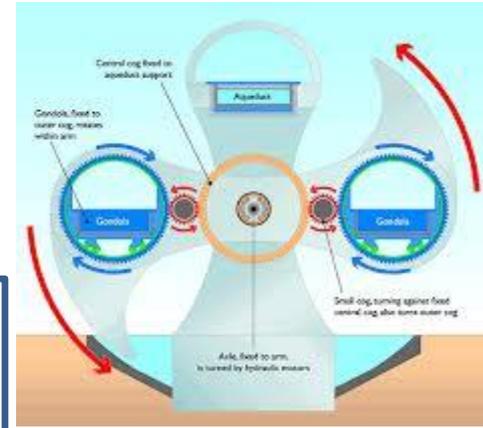
GMM
HS



THE FALKIRK WHEEL



TASK 1 (Inside the Visitors Centre



1. Find the height difference between the two canals that 'The Wheel' links. How many locks did 'The Wheel' replace? So, on average what drop in height did each lock allow?

2. The Falkirk Wheel is 35 metres tall, the equivalent of 8 double decker buses stacked on top of each other. From this information, calculate the height of ONE double decker bus.

3. The Wheel only uses 1.5KWh of energy to turn, the same amount as it would take to boil 8 household kettles. So, how much energy does one kettle use?

Important words here!

Equivalent

Stacked

Difference

THE FALKIRK WHEEL



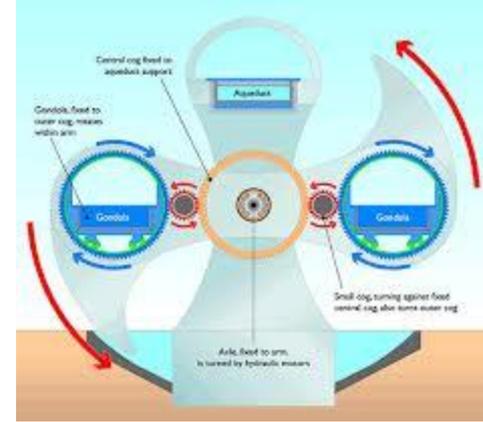
TASK 2A

1) Find out the number of seats on one boat.

2) If one seat on the boat costs £5, how much money would a full boat generate for one trip?

3a) There are 10 boat trips every day, calculate the daily revenue?

3b) On average the boats run on a 50% capacity. Now calculate the average ticket sales for one day



Important words here!

Revenue

Calculate

generate

THE FALKIRK WHEEL



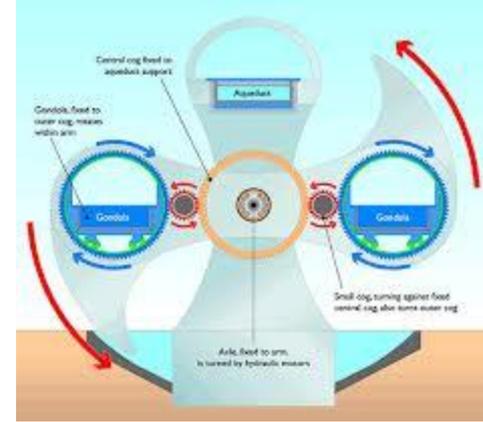
TASK 2B

Find out the number of seats on one boat.

If one seat on the boat costs £7.50 for a school group how much would a full boat generate?

If there are 12 'school' boat trips in one day how much revenue would this produce?

On average the boats run on a 75% capacity. Now calculate the average number of tickets sold on one day

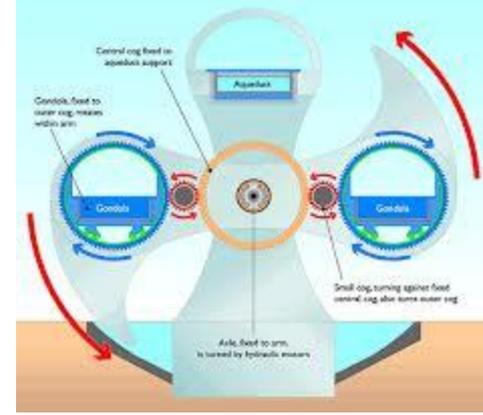


THE FALKIRK WHEEL



TASK 2C

Although there are 96 passenger seats on a boat the preferred (passenger comfort) is 90.



1. If, on one voyage, two thirds of the passengers were adults one third were young people (3-15), calculate the income from the ticket sales

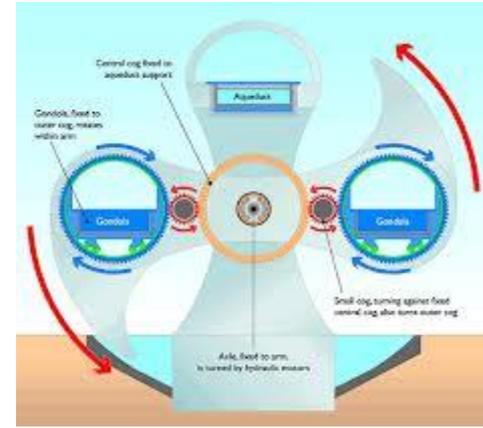
Standard Boat Trip
Adult £12.50
Concession £11
Child (3-15yrs) £7.50
Child (under 3) £1.50

3. On this voyage the passengers consisted of:
40% Adults
30% Concessions
20% (3-15) Child
10%(under5)Child
Find the income for this trip

Important words here!
concession
Income
voyage

THE FALKIRK WHEEL

TASK 3



Calculating the speed of the wheel

Using a stopwatch, find the time it takes the wheel to rotate 180° in seconds. If the diameter of the circular path it follows is 35 metres, calculate the length of this journey. The journey is a semi circle. Use this distance to calculate the average speed of the wheel journey.

$$C = \pi d$$

$$D =$$

$$S = \frac{D}{T}$$

$$T =$$

Important words here!

Rotate

Diameter

Circular

THE FALKIRK WHEEL

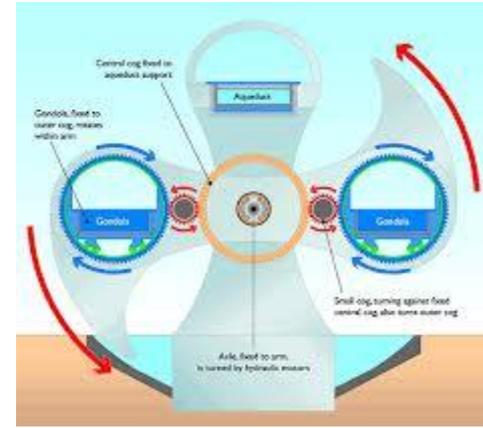


TASK 4

Calculating the diameter of the pool

The pool is designed on a major segment of a circle. This circle has a circumference of 377m

Use the formula $C = \pi d$ to calculate the diameter

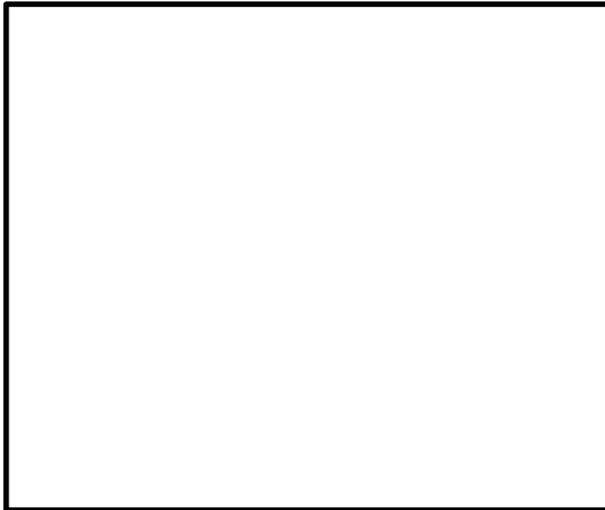


Important words here!

Segment

circumference

major



THE FALKIRK WHEEL



TASK 5

Calculating the height of the wheel

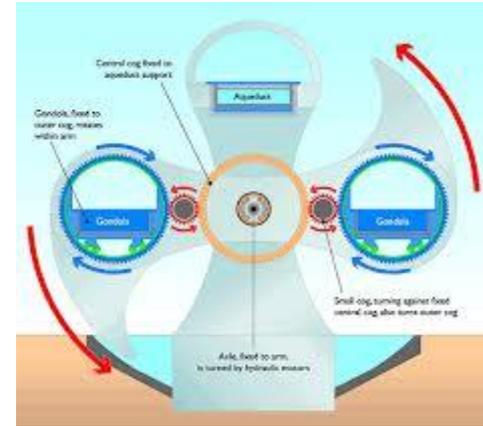
1. Go to the 30 or 40 metre cone and use the clinometers to find the angle of elevation from this point.

Angle of
Elevation

2. Now, using a suitable scale and your angle of elevation, draw a right angled triangle to find the height of the 'Wheel'

Scale

Compare your result with the data displayed inside the centre.



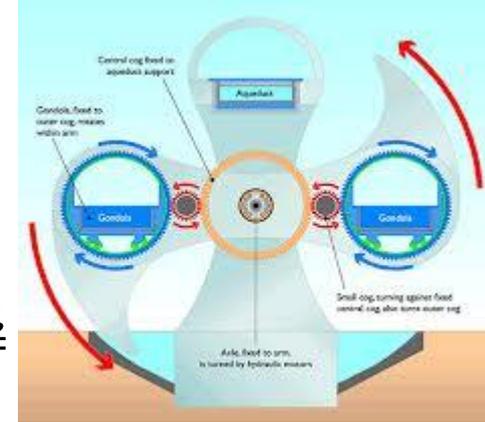
**Important words
here!**

elevation

suitable

scale

THE FALKIRK WHEEL



TASK 6A

Calculating the area of the roof on the visitor centre



The roof consists of lots of SQUARE windows and white areas. The length of one window is 2m.

The first task is to count all the windows.

Now calculate the area of one window

1.

1. Work out the total area of the windows

2. As the white squares are the same size as the window squares, count and calculate the area of the white squares

3. Now ESTIMATE the area of those parts of white squares at the edge of the roof

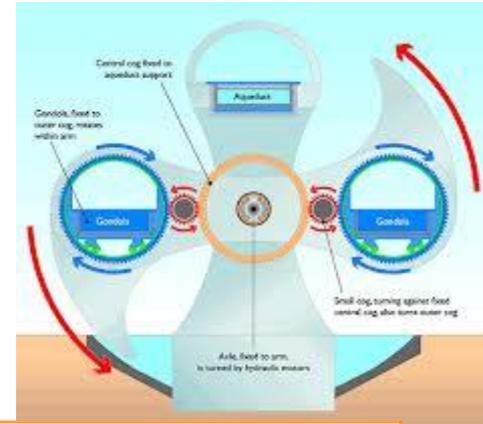
2.	Add answers 1,2 and 3 to find your estimate of the roof area
3.	

THE FALKIRK WHEEL

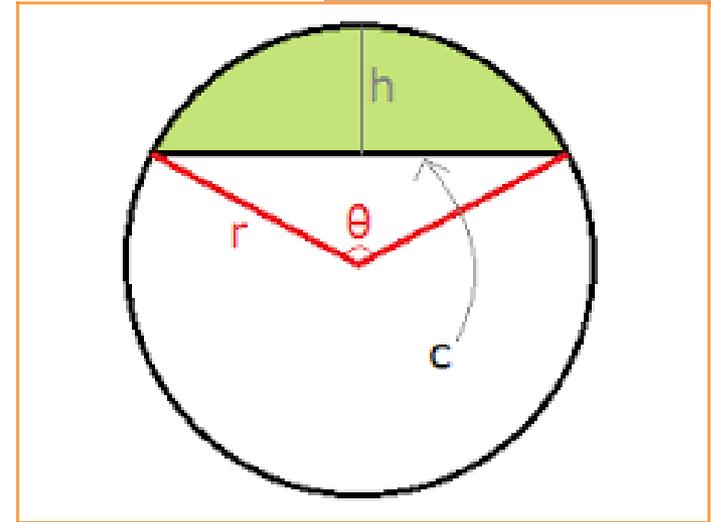


TASK 6B

Calculating the area of the roof of the visitor centre



The shape of the roof can be described as a **segment** of a circle. The length of the base of the sector ($c = 80\text{m}$) and the height, $h = 20\text{m}$ and the angle $\theta = 106.3^\circ$



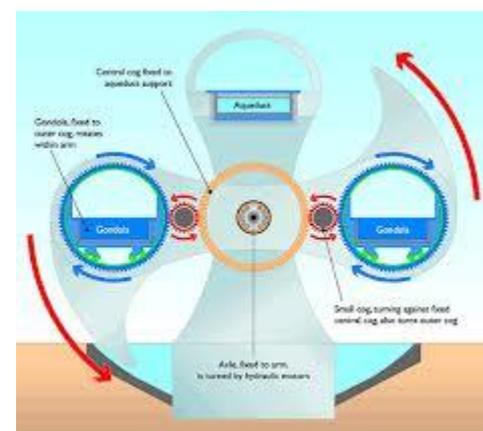
Use this data to calculate the area of the roof!

THE FALKIRK WHEEL



Teaching Notes:

Task 1 : (All the relevant data is displayed inside the Visitors Centre. 1.) 3.182m 2.) 4.375m. 3.) 0.1875kWh



Task 2/2A/2C : Each boat can seat 96 passengers

,but the administrators prefer to board 90 on each sailing. Given three 'differentiated' tasks involving ticket sales. Task 2C are the actual prices **Mar. 2016**

Task 2A The maximum capacity is 96, the 'The Falkirk Wheel' informs me they prefer to operate on a capacity of 90 for passenger comfort

$$\begin{aligned} 96 \times £5 &= £480 \\ 90 \times £5 &= £450 \\ 0.5 \times 10 \times 96 &= 480 \\ 0.5 \times 10 \times 90 &= 450 \end{aligned}$$

Task 2B

The maximum capacity is 96, the 'The Falkirk Wheel' informs me they prefer to operate on a capacity of 90 for passenger comfort

$$\begin{aligned} 96 \times £7.50 &= £720 \\ 90 \times £7.50 &= £675 \\ 0.75 \times 12 \times 96 &= 864 \text{ tickets} \\ 0.75 \times 12 \times 90 &= 810 \text{ tickets} \end{aligned}$$

- **Adult** £12.50
- **Concession** £11.00
- **Child (3-15yrs)** £7.50
- **Child (under 3)** £1.50

Task 2C 1.

$$\begin{aligned} 60 \times £12.50 &= £750 \\ 30 \times £7.50 &= £225 \end{aligned}$$

Task 2C 2.

40% Adults	36 x £12.50 =	£ 450
30% Concessions	27 x £11 =	£ 297
20% (3-15) Child	18 x £7.50 =	£ 135
10% (under 5) Child	9 x £1.50 =	£ 13.50

Total £895.50



Task 3 : (Self explanatory!) Using
 $C = \pi d$ and $S = D/T$

Task 4 : I attempted to measure the circumference using a trundle wheel but it is not quite possible to complete the journey in its entirety as the visitors centre gets in the way! The student will have to change the subject to 'd'
My estimate circumference is 377metres $377/3.14 = 120$ metres

Task 5 : This task involves scale drawing. You will need a 'clinometer' to find the angle of elevation and a trundle wheel too! (I just set two cones at 30m and 40m to help carrying out this task.)

Task 6A/6B : Calculating the area of the roof of the visitors centre. It consists of a segment of a circle. I am asking the students to use two techniques to obtain this result

6A I just counted the areas on one half from the photograph on sheet and got the estimated result 1066m^2

6B By calculation : $r^2 = (r-20)^2 + 40^2$ so $r = 50\text{m}$ giving area of roof 1116m^2