

Year 8 Maths - Mathematical Investigation
Friday 27th May - Periods 1 and 2

The Tethered Goat

Formulae:	Circumference of Circle	$C = \pi D$ or $C = 2\pi r$
	Area Circle	$A = \pi r^2$

A goat is tethered to a rope that is attached to a peg in the ground so that it can graze in a circle. The farmer lengthens the distance of the rope as the goat eats all the grass in the circle.

1. Draw a diagram showing the regions the goat can graze in if the rope is 10m long, 20m long, 30m long, 40m long, 50m long and 60m long.

2. Complete the following table that shows how far the goat can walk in one complete circle (assuming the rope is taut at all times) for the different lengths of rope. (Answer correct to two decimal places.)

Rope Length	10m	20m	30m	40m	50m	60m
Dist. Walked						

Workings:

3. How much further does the goat walk when the rope is 50m long compared to when the rope is 10m long?

4. When the rope is 30m long, what distance does the goat walk, if it walks 10 times around. Give your answer in kilometres.

5. If the goat takes 4 minutes to walk one complete circle when the rope is 30m long, what distance (in metres) would it walk in 20 minutes?

6a) Determine the area the goat can graze when the rope is 40m and 60m long.

b) Determine the area the goat can graze when the rope is 20m and 30m long.

c) When the length of the rope is doubled, does this mean the goat grazes double the area? What is the relationship / ratio of areas when the rope is doubled in length?

7. Plot a line graph of rope length (x axis) versus distance walked (y axis), on the axes below.

8. Using your graph explain the relationship between rope length and distance walked. Can you establish a pattern or develop a rule between rope length and distance walked by the goat?

9. Using the pattern or rule from Question 8:

a) How far would the goat walk if the rope was 80m long?

b) If the goat walks 753.6m, how long is the rope?

10. Discuss your results. How could the farmer use the information you have discovered. How could this information benefit the farmer? How could this knowledge/information be applied to other situations?

Year 8 Maths - Mathematical Investigation (Practice Task)

Getting Fit

Formulae:	Circumference of Circle	$C = \pi D$ or $C = 2\pi r$
	Area Circle	$A = \pi r^2$

Ally was concerned about her level of fitness. After talking to her PE teacher she decided to train at the local Athletics Club three times a week, until her fitness improved. She visited the track and found that it was circular with six lanes. The distance from the centre of the circle to the inside edge of lane one was 32m and each lane was 1m wide.

1. Draw a diagram and label the distances to the inside edge of each lane.

2. Complete the following table which shows the distance Ally would run if she ran one lap on the inside edge of each lane.

Lane	1	2	3	4	5	6
Dist. Run						

Workings:

3. How much further does Ally run if she runs on the inside edge of lane 6 compared to running on the inside edge of lane 1?

4. What distance would Ally run if she completed 12 laps on the inside edge of lane 3? Give your answer in kilometres.

5. If Ally takes 80 seconds to run one lap on the inside edge of lane one what distance (in metres) would she run in 20 minutes?

6a) The Athletics Club uses the region inside the running track for their field events. What area do they have to complete these events.

b) What is the area of the total athletic track including all the lanes?

c) What is the percentage of the field event area to the total area?

d) In a different suburb another Athletics Club has a much larger track, where the distance from the centre of the circle to the inside edge of lane one is 64m. They also use the region inside the running track for field events. What area do they have to complete the field events? Is it double the area of Ally's Athletic Club? What is the approximate ratio of field event areas?

7. Construct a line graph of lane number (x axis) versus distance run (y axis), on the axes below.

8. Using your graph explain the relationship between the lane number and distance completed in one lap. Can you establish a pattern or develop a rule between lane number and distance completed?

9. Using the pattern or rule from Question 8:

a) How far would Ally run in one lap if the athletics track had 12 lanes and she ran in lane 11?

b) If Ally ran 257.61m in one lap, which lane was she running in?

10. Discuss your findings and how Ally could use this to help with her training. Can you apply this information to other situations?