

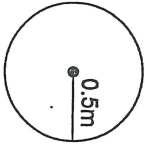
Class time allocated: 50 minutes

Total Marks: 40

Layton has just moved into a new house and is looking at landscaping his backyard. He wants a circular brick-paved feature within his garden. Around the feature he wishes to have a row of cobblestones as a border.

Layton needs some help to decide what size his brick-paved feature should be and to work out how much it is going to cost.

1. [2 marks]
 Calculate the circumference of a circle with radius 0.5 m.



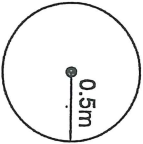
$$C = 2\pi \cdot 0.5 \checkmark$$

$$= 3.142\text{m} \checkmark$$

(Round all answers to 3dp)

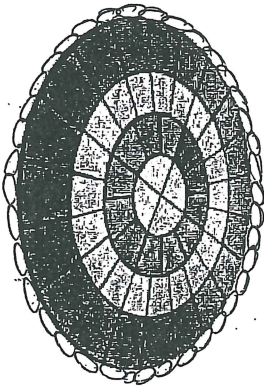
-1 if incorrect
 -1 if incorrect rounding
 -1 if incorrect units used

2. [2 marks]
 Calculate the area of a circle with radius 0.5 m.



$$C = \pi \times 0.5^2 \checkmark$$

$$= 0.785\text{m}^2 \checkmark$$



3. [2 marks]

- (a) Which measurement best describes the amount of cobblestones required? (Please circle)

CIRCUMFERENCE

AREA

- (b) Which measurement best describes the amount of bricks required? (Please circle)

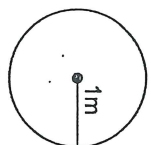
CIRCUMFERENCE

AREA

Layton would like to investigate different possible sizes for his feature.

4. [1, 1, 1 = 3 marks]
 Calculate the circumference of each circle below.

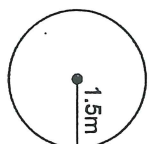
(a)



$$C = 2\pi \cdot 1 \checkmark$$

$$= 6.283\text{m}$$

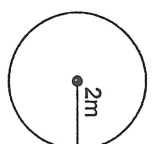
(b)



$$C = 2\pi \cdot 1.5 \checkmark$$

$$= 9.425\text{m}$$

(c)



$$C = 2\pi \cdot 2 \checkmark$$

$$= 12.566\text{m}$$

5. [1 mark]
 Use your answers from questions 1 and 2 to complete the table below.

Radius of Circle (m)	Circumference of Circle (m)
0.5	3.142
1	6.283
1.5	9.425
2	12.566

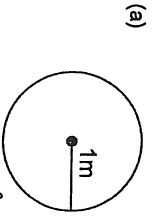
6. [2 marks]
 When the radius of a circle is doubled, does the circumference also double? (Show evidence/calculations to support your answer.)

Yes $r=1, C=6.283$ $r=2, C=12.566 = 6.283 \times 2$ \checkmark

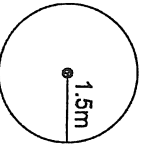
7. [2 marks]
 When the radius of a circle is tripled (three times as long), what happens to the circumference? Does it also triple? (Show evidence/calculations to support your answer.)

Yes $r=0.5, C=3.142$ $r=1.5, C=9.425 = 3.142 \times 3$ \checkmark

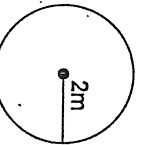
1. [1, 1, 1 = 3 marks]
Calculate the area of each circle below.



$$A = \pi \cdot 1^2 = 3.142 \text{ m}^2$$



$$A = \pi \times 1.5^2 = 7.069 \text{ m}^2$$



$$A = \pi \times 2^2 = 12.566 \text{ m}^2$$

9. [1 mark]
Use your answers from questions 2 and 4 to complete the table below.

Radius of Circle (m)	Area of Circle (m ²)
0.5	0.785
1	3.142
1.5	7.069
2	12.566

10. [3 marks]
When the radius of a circle is doubled, does the area also double? (Show evidence/calculations to support your answer.) If not what is happening?

NO $r = 0.5, A = 0.785$
 $r = 1, A = 3.142 \neq 0.785 \times 2$

11. [3 marks]
When the radius of a circle is tripled (three times as long), what happens to the area? Does it also triple? (Show evidence/calculations to support your answer.) If not what is happening?

NO $r = 0.5, A = 0.785$
 $r = 1.5, A = 7.069 \neq 3 \times 0.785$

Price List

Brick Pavers (feature)	\$65 per m ²
Cobblestones (border)	\$9.50 per 1m of border

12. [3 marks]
Layton decides to make a circular feature with a radius of 1m. Using the price list above, how much will Layton's feature cost in total?

$$C \times 9.50 = 6.283 \times 9.50 = \$59.69$$

$$A \times 65 = 3.142 \times 65 = \$204.23$$

$$3.14 \times 65 = 204.10$$

$$6.28 \times 9.5 = 59.66$$

$$204.10 + 59.66 = 263.76$$

13. [2 marks]
Layton then realises that he could afford to build a bigger feature. He decides to double the radius. Without doing calculations, do you think that the new cost will be

- (i) less than double the original cost?
(ii) exactly double the original cost?
(iii) More than double the original cost? ☒

[Circle correct answer]
Explain your choice.

AS Area more than doubles

14. [3 marks]
Calculate the total cost of the new feature (with the doubled radius).

$$12.566 \times 9.50 = 119.38$$

$$12.566 \times 65 = 816.79$$

$$119.38 + 816.79 = 936.17$$

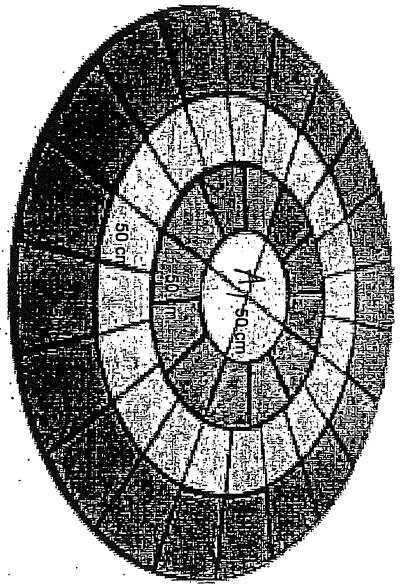
$$13 \times 9.5 = 123.50$$

$$845 + 123.50 = 968.50$$

15. [2 marks]
Is the new cost less than, more than or exactly double the original cost? (Show evidence/calculations to support your answer).

$$\frac{936.17}{263.92} = 3.5$$

more than double



16. [4 marks]

For the design above calculate the area to be paved by the light coloured pavers.

$$A_1 = \pi \cdot 50^2 \checkmark$$

$$= 7853.98 \text{ cm}^2$$

$$A_2 = \pi \cdot 150^2 - \pi \cdot 100^2 \checkmark$$

$$= 39269.91 \text{ cm}^2$$

$$7853.98 \checkmark$$

$$37269.91 \checkmark$$

$$47123.89 \text{ cm}^2 \checkmark$$

$$(4.71 \text{ m}^2) \checkmark$$

$$10685.83471 - 31415.92654$$

17. [2 marks]

What percentage of the design will be covered by the light pavers?

$$\pi \cdot 200^2 = 125663.71 \checkmark$$

$$\frac{47123.89 \checkmark}{125663.71} \times 100 = 37.57\%$$