SMILE WORKCARDS

Circle Measurement Pack Two

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D.I.Y. Earrings

Khani and Farkid are making earrings to sell at the school fair. They are using copper and silver discs with diameters of 1cm, 1.5cm, 2cm, 4cm and 5 cm.

1cm² of copper costs 1p.

1cm² of silver costs 20p.

Hoops cost 10p a pair.

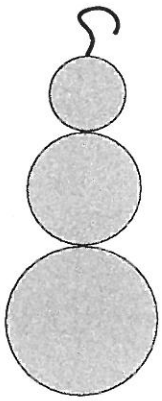
Area of circle = πr^2
(π x radius x radius)

Use the button marked (π) on your calculator.

A reasonable approximation to (π) is 3.14.

How much would each pair of these earrings cost to make? Give your answers to the nearest penny. Only round off your answers at the end.

A.



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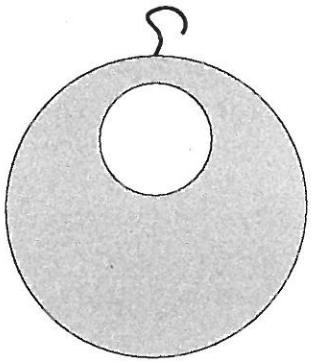

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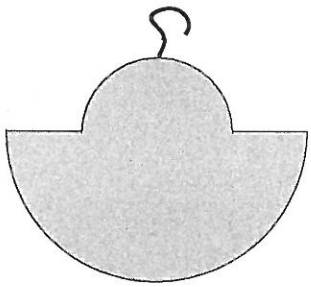

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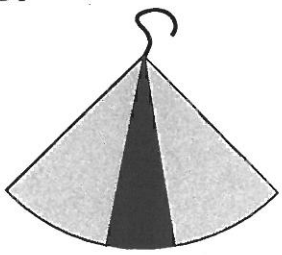

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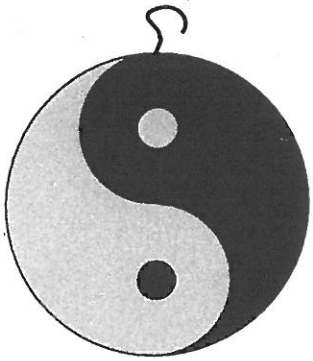

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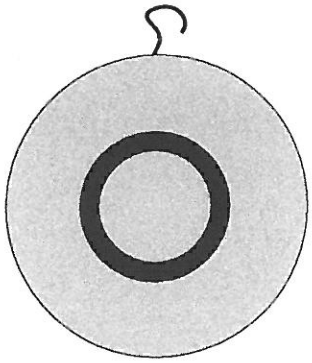

Khani and Farkid want to make a profit of 120% on each pair of earrings.

*How much do they need to charge for a pair of the earrings in **C**?*

Design and cost your own earrings using the copper and silver discs.

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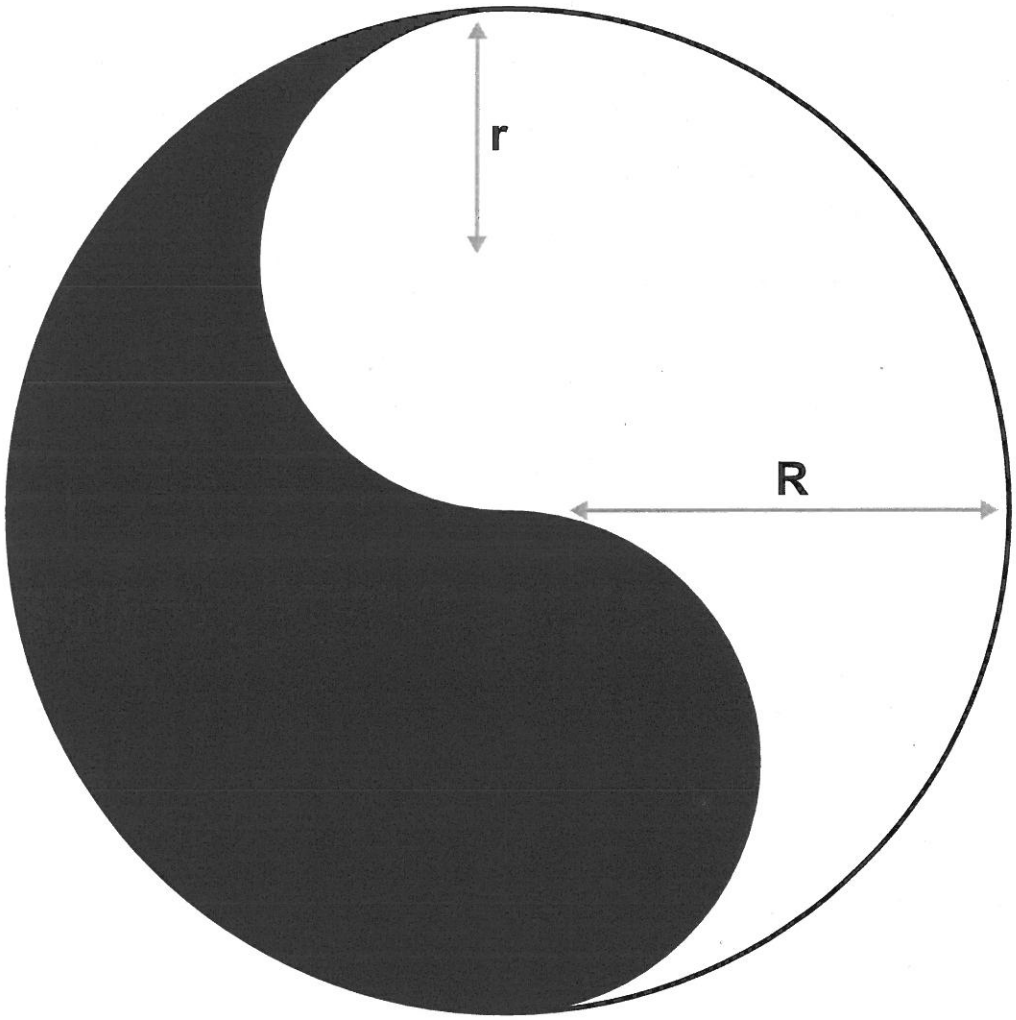
Circle Cut

In the diagram below, the radius of each small semicircle (**r**) is half the radius of the outer circle (**R**).



Make one straight cut across the circle so that each of the two regions is exactly halved.

Use algebra to justify your answer.

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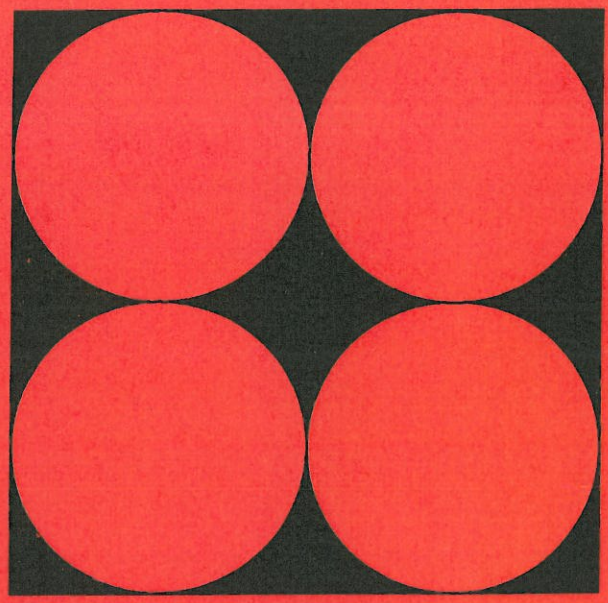
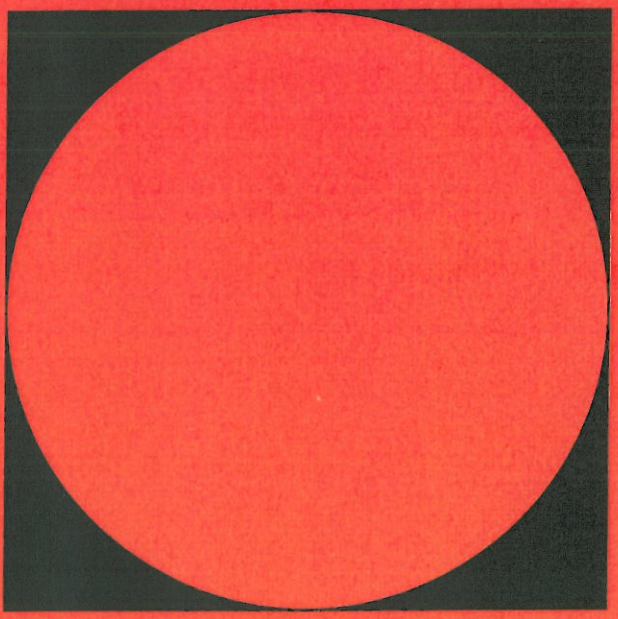
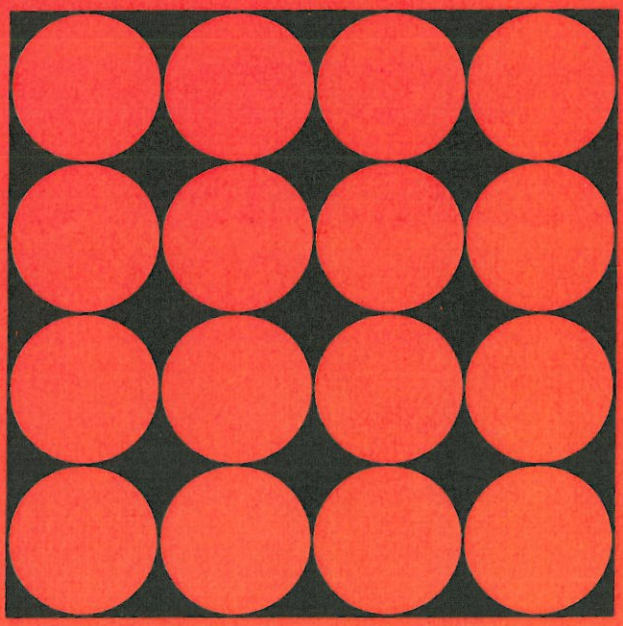
CIRCLE PACKING



1. What percentage of these squares is shaded?

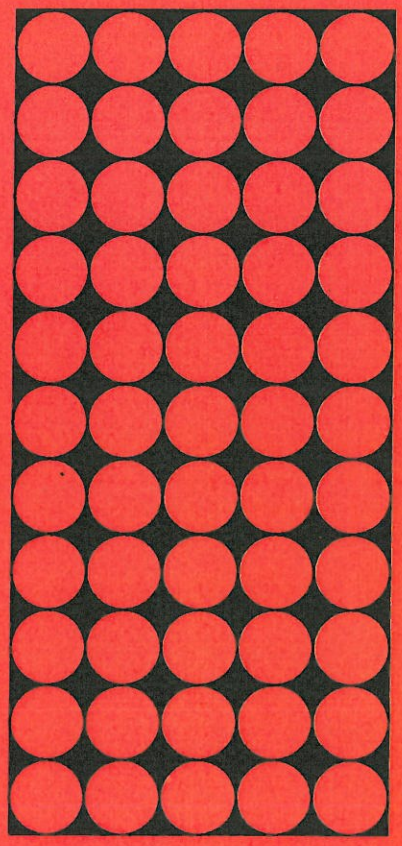




2. Find a packing arrangement which reduces the shaded area . . .

. . . for different rectangles

. . . for an infinite plane.



What is the **lowest** percentage of shaded area that can be achieved?

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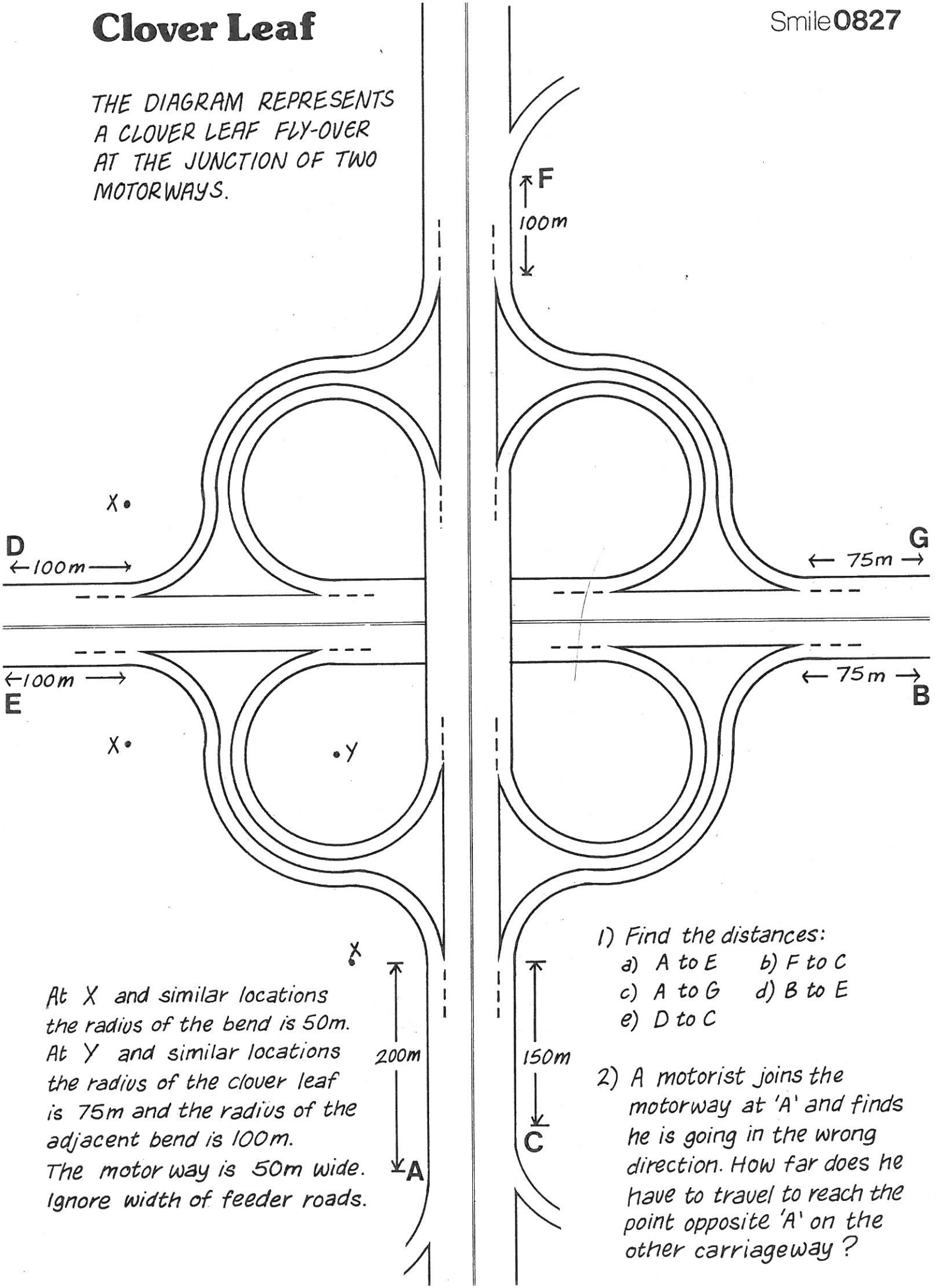
Clover Leaf

THE DIAGRAM REPRESENTS A CLOVER LEAF FLY-OVER AT THE JUNCTION OF TWO MOTORWAYS.



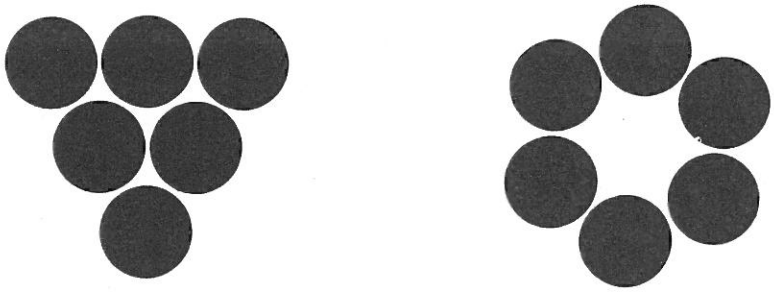
At X and similar locations the radius of the bend is 50m. At Y and similar locations the radius of the clover leaf is 75m and the radius of the adjacent bend is 100m. The motor way is 50m wide. Ignore width of feeder roads.

1) Find the distances:
   a) A to E b) F to C
   c) A to G d) B to E
   e) D to C

2) A motorist joins the motorway at 'A' and finds he is going in the wrong direction. How far does he have to travel to reach the point opposite 'A' on the other carriageway ?

Circles, triangles and hexagons

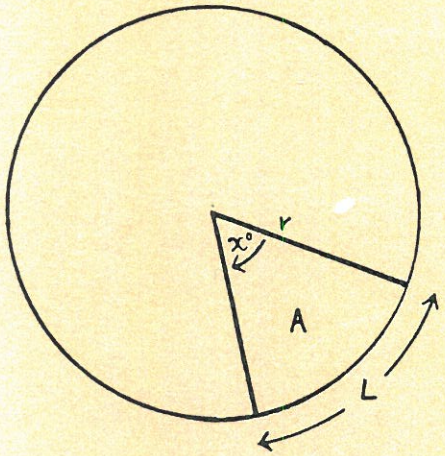
6 cans may be arranged in a triangle or in a hexagon.



Show that an elastic band placed around either of the arrangements would have the same length.

READ

If you cut a portion of apple tart, and the angle at the centre is x^0 ....



.... you take $\frac{x}{360}$ of the apple in the middle

.... and also $\frac{x}{360}$ of the pie crust around the edge.

COPY AND COMPLETE

area of sector $= \frac{x}{360}$ of area of circle

$\therefore A = \frac{x}{360} \times$ ■

BUT.....

length of arc $= \frac{x}{360}$ of circumference of circle

$L = \frac{x}{360} \times \square$

SO.....

$\frac{x}{360} = \frac{L}{\square}$

$\therefore A =$ ■

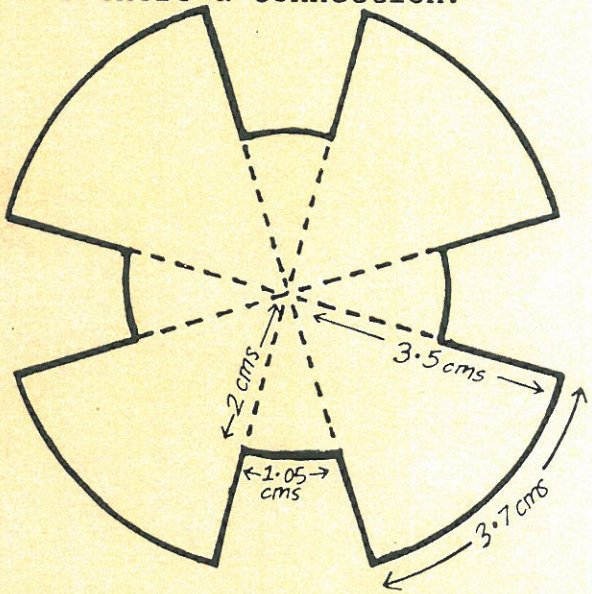
$\therefore A =$ ■

CHECK

Use the answer book to check that you have the correct formula for the area of a sector of a circle.

SOLVE

(1) Does this formula remind you of any other area formula?
Is there a connection?



(2) Find the area of the metal sheet in this medallion - try it as a mental arithmetic exercise (you don't need to multiply 3.5 by 3.7 - there's a short cut)

(3) Design another medallion made up of sectors and find the area of metal sheet needed.

0796

SMILE

DARTS PROBABILITY

John is a very poor player. Although he always hits the board, he has no skill and is equally likely to hit any part of the board.

(1) What is the probability that he scores a double with his first throw? (You will need to calculate the area of the ring)

(2) What is the probability of his scoring 50 with one dart?

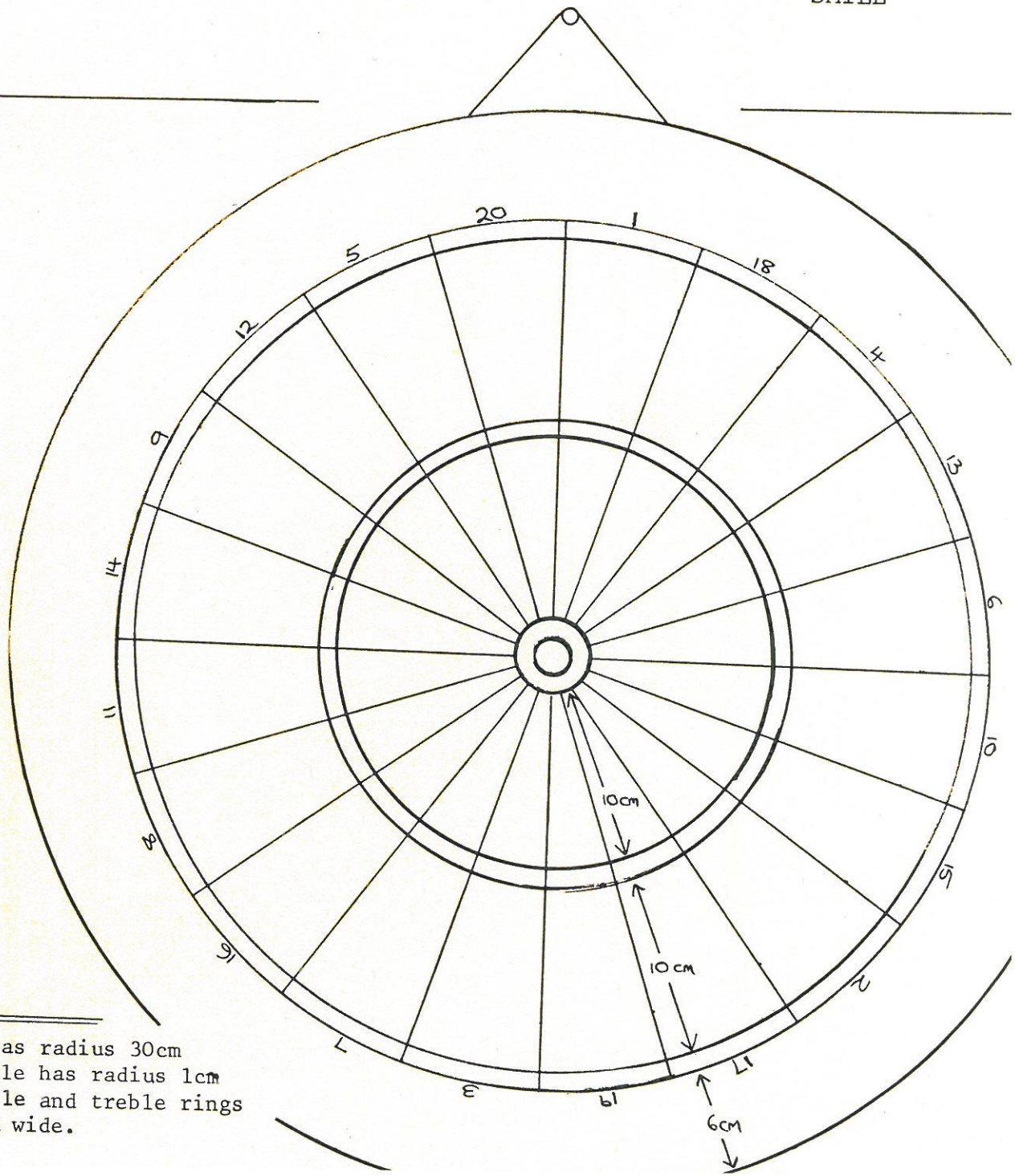
(3) About how often can he be expected to miss the scoring area altogether?

(4) What is the probability of scoring 60 with one dart?

(5) John is throwing one dart to see which team starts first in a competition. His opponent scores 45.

(a) In how many different ways can John beat this score?

(b) What is the probability that John's team starts first?



The board has radius 30cm
The 50 circle has radius 1cm
The 25, double and treble rings are all 1cm wide.

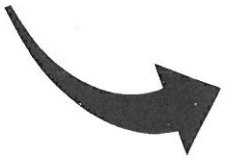
Materials: circle shapes, scissors.

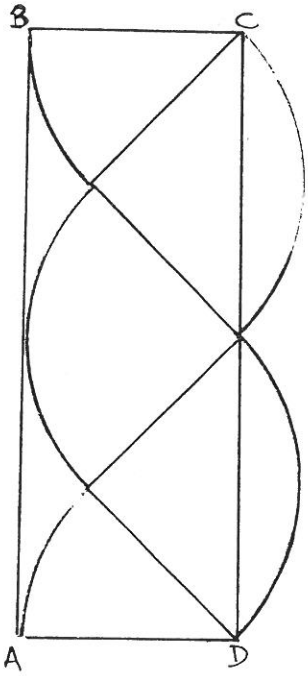
APPROXIMATION & π

Fold a circle shape into quarters and cut along the folds.

Cut one of the quarters into two equal parts.

Stick them into your book.





★ The rectangle ABCD has approximately the same area as the circle. ★

(1) Calculate this area by measuring AB and BC.

✪ The more sectors you start with, the better the approximation will be. ✪

(2) Fold a circle of the same size into 8 sectors and repeat. Calculate the approximate area.

(3) Repeat this again using 16 sectors.

(4) Explain why the statement ✪ is true.

(5) Follow through the working below to understand the statement ★

Circumference of circle = $2\pi r$

AB is approximately half of the circumference (why?)

So AB = πr (approx.)

BC = r

(why?)

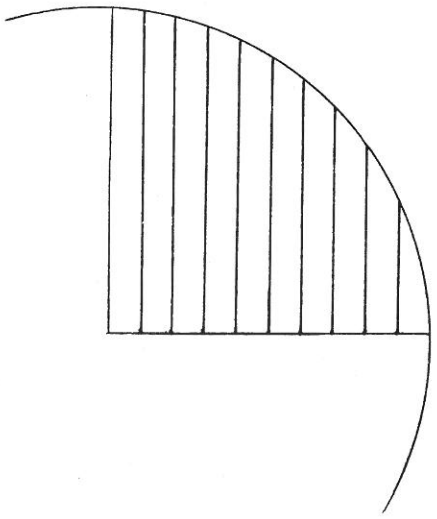
Area of rectangle, ABCD

= AB x BC

= $\pi r \times r$ (approx)

= πr^2 (approx)

(6) Work through the following to find a value for π.



Draw a circle, radius 10cm , on graph paper.

Divide the circle into strips, width 1cm.

Each strip is approximately a trapezium. Find the area of each one to calculate the approximate area of the circle.

Copy and complete:-

Area of circle		=	π r^2	
So	■	=	π ■^{2}	(approx.)
So	π	=	■	(approx.)

(7) Repeat with a circle of different size to check your answer.

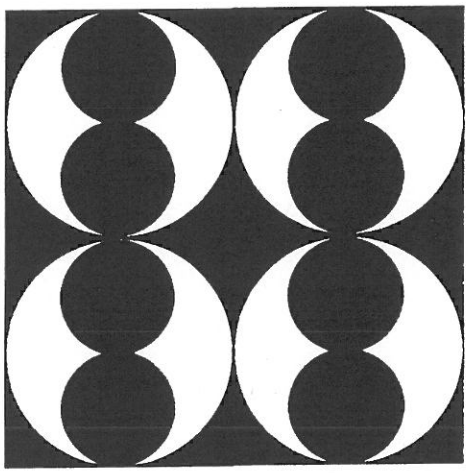
Smile **2036**

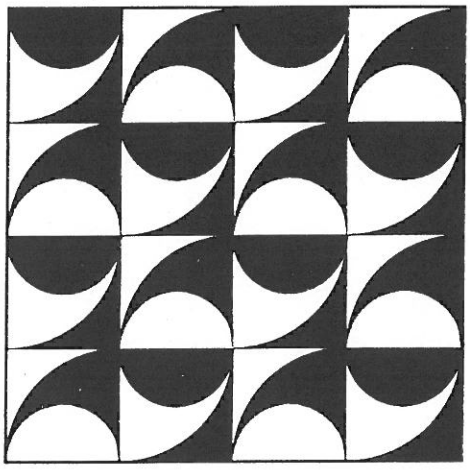
Fabric Designs

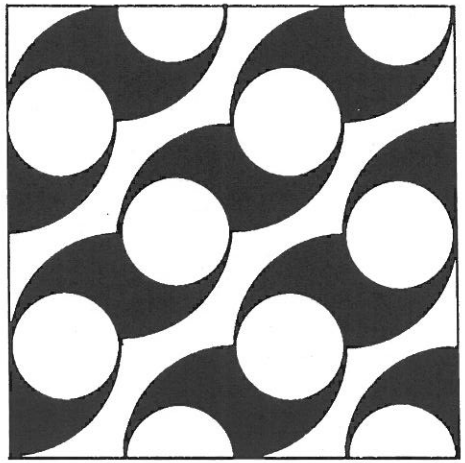
These designs all use **circles, semicircles** and **quadrants**.

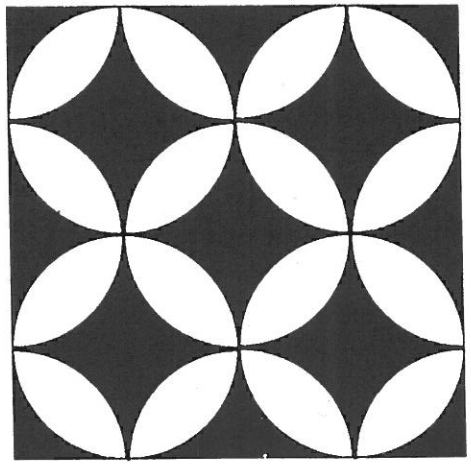
In each case, is there more black or more white?

Justify your answers.









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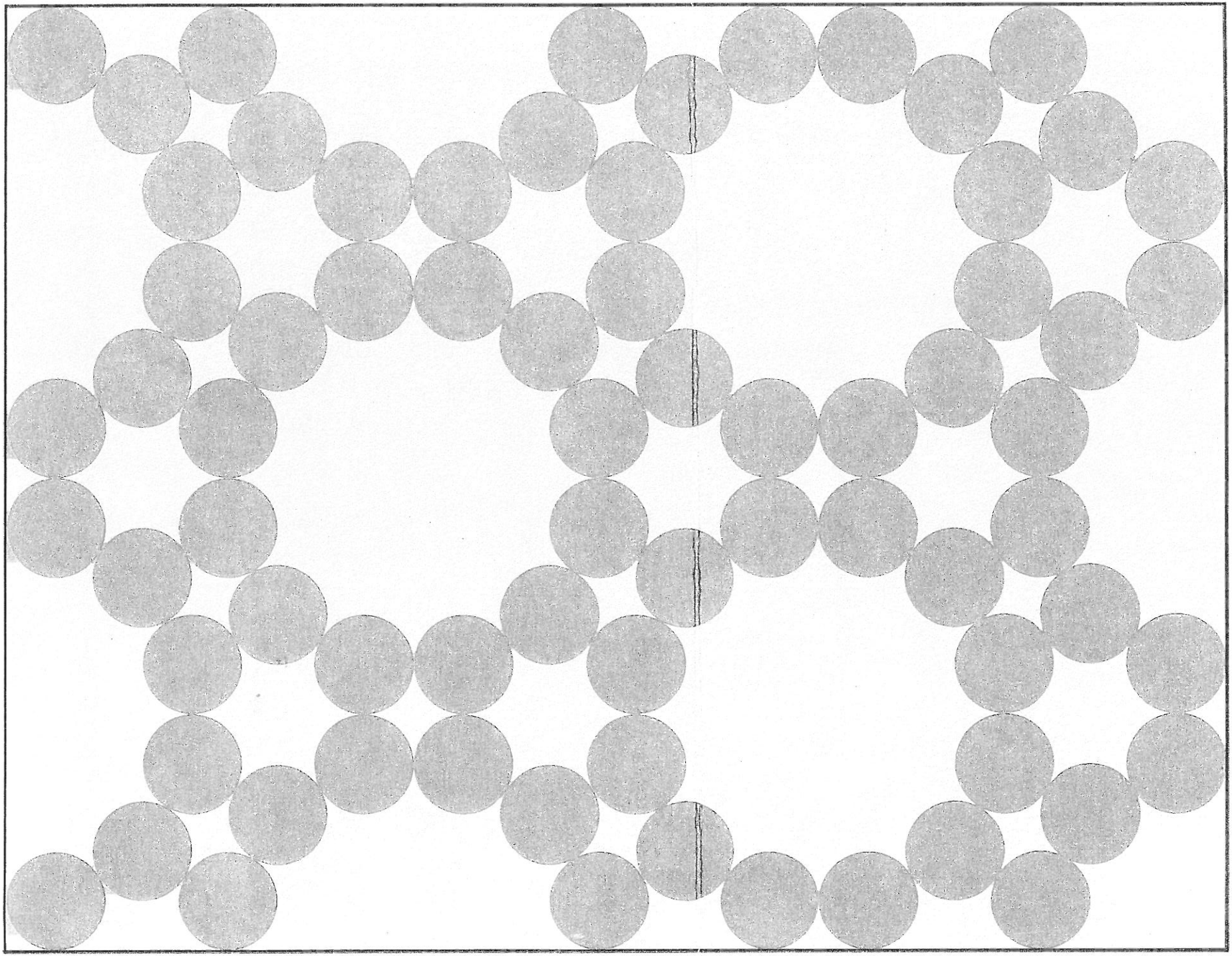

GREY AREAS

Smile 2135

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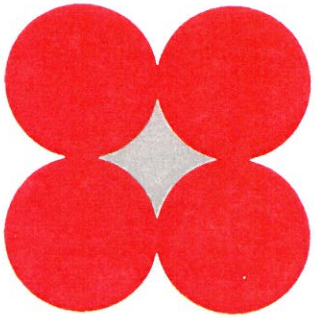
What is the area of grey in the middle?



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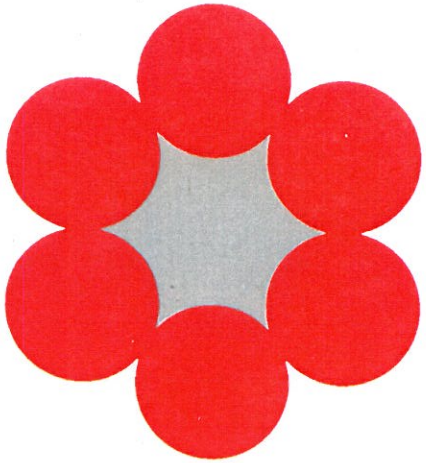

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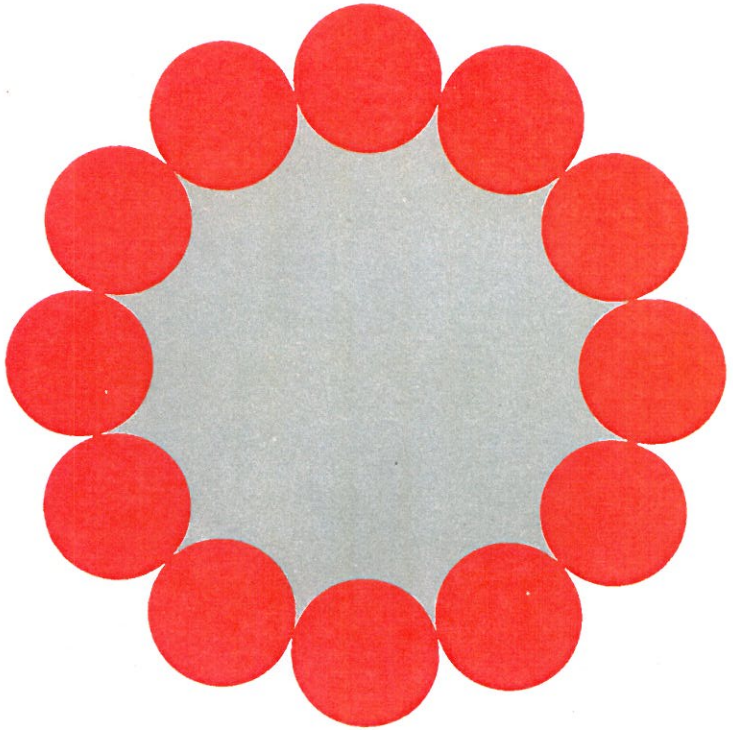

What is the area of grey in the pattern on the outside?