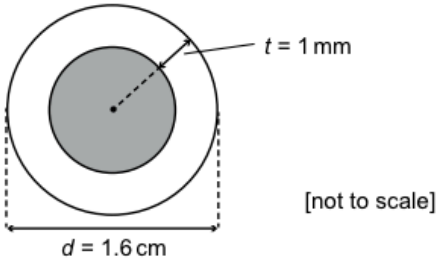
12 The diagram represents the circular cross-section of an artery with external diameter d of 1.6 cm. The thickness t of the artery wall is 1 mm.



What is the internal cross-sectional area of the artery (shaded in the diagram)?

A $0.36\pi\,\text{mm}^2$

B $14\pi\,\text{mm}^2$

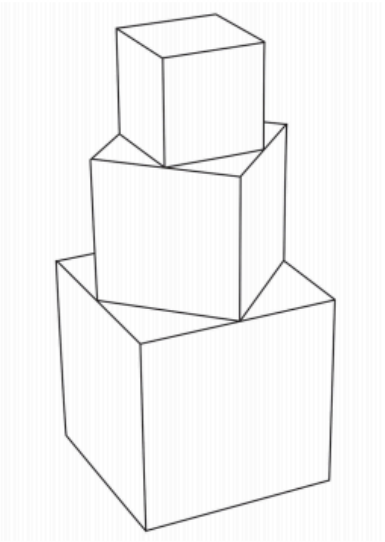
C $15\pi\,\text{mm}^2$

D $49\pi\,\text{mm}^2$

E $225\pi\,\text{mm}^2$

2016

20 A solid shape is made by joining three cubes together with the largest cube on the bottom and the smallest on the top. Where the faces of two cubes join, the corners of the smaller cube are at the midpoints of the sides of the larger cube.



The sides of the smallest cube have a length of 1 cm. What is the total surface area of the shape?

A 30 cm^2

B 32 cm^2

C 33 cm^2

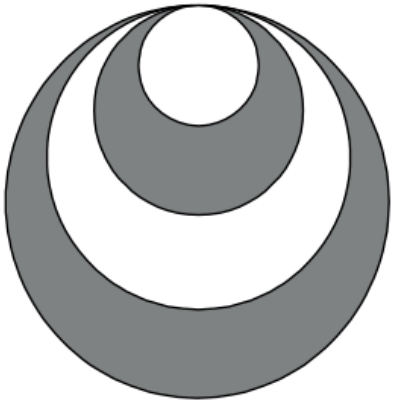
D 36 cm^2

E 39 cm^2

F 42 cm^2

2013

4 The design in the diagram is formed from four circles which all touch at the top of the shape (the diagram is not to scale).



The diameter of the smallest circle is d, the second is $2d$, the third is $3d$ and the largest is $4d$.

Find an expression for the area of the shading in the design.

A $\frac{5}{2}\pi d^2$

B $4\pi d^2$

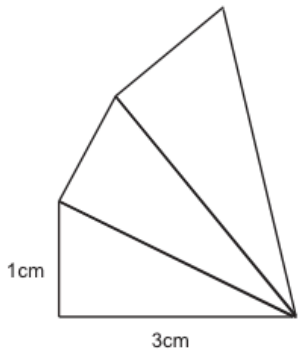
C $\frac{1}{4}\pi d^2$

D $10\pi d^2$

E $\frac{3}{2}\pi d^2$

2012

20 The diagram shows three similar right-angled triangles.



What is the area of the largest triangle?

A $\frac{5}{3}\text{cm}^2$

B $\frac{50}{27}\text{cm}^2$

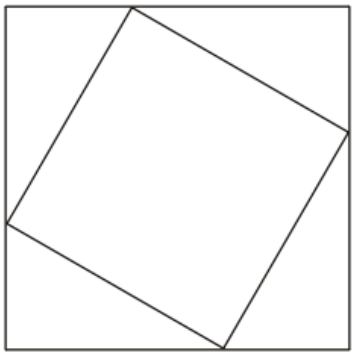
C 5cm^2

D 15cm^2

E $\frac{50}{3}\text{cm}^2$

2011

24 A design is set up by joining the points which are one third of the way along the sides of a square. This forms a second square as shown.



This process is repeated.

Calculate the area of the fourth square as a fraction of the original square.

A $\frac{1}{27}$

B $\frac{5\sqrt{5}}{81}$

C $\frac{125}{729}$

D $\frac{25}{81}$

E $\frac{5\sqrt{5}}{27}$

2010