

Angles (Senior UKMT)

These questions must be attempted without a calculator

Topics covered in the questions below may not necessarily be from the topic of the title.

1. When written in decimal form, $\frac{1}{81} = 0.0123456790123\dots$

What is the value of $\frac{2}{81}$ correct to six decimal places?

- A 0.02468 B 0.024681 C 0.024690 D 0.024691 E 0.0246914
2. A pizzeria sells pies at 4p for 5, or 1p each. If Simon simply buys 2004 pies, what is the least amount he could pay?
- A £4.04 B £8.04 C £12.04 D £16.04 E £20.04
3. Timmy Riddle was selling toffee apples at the school fête. When I asked him what they cost he said "One toffee apple costs the smallest amount that cannot be paid exactly using four or fewer standard British coins".

I bought as many toffee apples as I could get for £1. How much change did I receive?

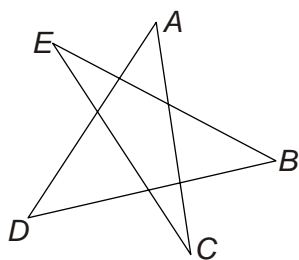
- A 1p B 5p C 18p D 22p E 24p
4. $ABCDEFGH$ is a regular octagon. P is the point inside the octagon such that triangle ABP is equilateral.

What is the size of angle APC ?

- A 90° B 112.5° C 117.5° D 120° E 135°
5. The size of each exterior angle of a regular polygon is one quarter of the size of an interior angle.

How many sides does the polygon have?

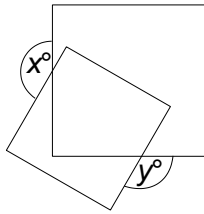
- A 6 B 8 C 9 D 10 E 12
6. In the figure shown, what is the sum of the interior angles at A, B, C, D, E ?



- A 90° B 135° C 150° D 180° E more information required.

7. The diagram shows overlapping squares.

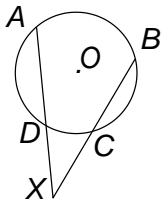
What is the value of $x + y$?



- A 270 B 300 C 330 D 360 E more information needed

8. In the diagram, O is the centre of the circle, $\angle AOB = \alpha$ and $\angle COD = \beta$.

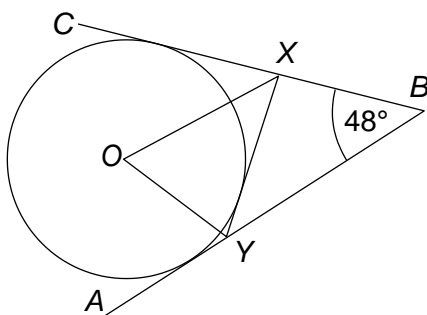
What is the size of $\angle AXB$ in terms of α and β ?



- A $\frac{1}{2}\alpha - \frac{1}{2}\beta$ B $90^\circ - \frac{1}{2}\alpha - \frac{1}{2}\beta$ C $\alpha - \beta$
D $180^\circ - \alpha - \beta$ E more information needed

9. In the diagram AB , CB , and XY are tangents to the circle with centre O and $\angle ABC = 48^\circ$.

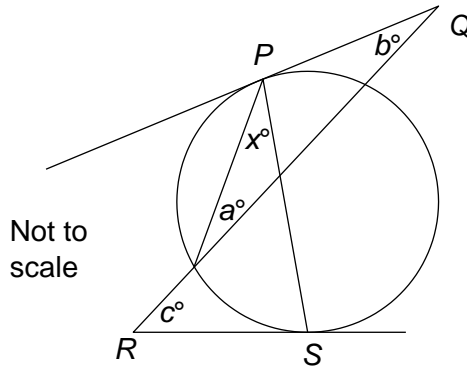
What is the size of $\angle XOY$?



- A 42° B 69° C 66° D 48° E 84°

10. In the figure, PQ and RS are tangents to the circle.

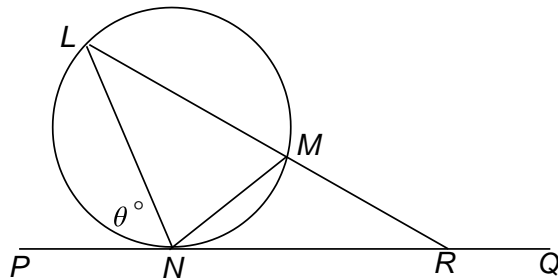
Given that $a = 20$, $b = 30$ and $c = 40$, what is the value of x ?



- A 20 B 25 C 30 D 35 E 40

11. In the diagram, the line PQ is a tangent at N to the circle through points L , M and N . The lengths LM and LN are equal.

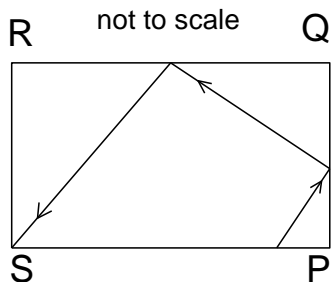
The line LM produced meets the tangent PQ at the point R . If $\angle PNL = \theta^\circ$, what is the value, in degrees, of $\angle LRP$?



- A $3\theta - 180$ B $180 - 2\theta$ C $180 - \theta$ D $90 - \frac{1}{2}\theta$ E θ

12. A toy pool table is 6 feet long and 3 feet wide. It has pockets at each of the four corners P , Q , R and S . When a ball hits a side of the table, it bounces off the side at the same angle as it hit that side. A ball, initially 1 foot to the left of pocket P , is hit from the side SP towards the side PQ as shown.

How many feet from P does the ball hit side PQ if it lands in pocket S after two bounces?



- A 1 B $\frac{6}{7}$ C $\frac{3}{4}$ D $\frac{2}{3}$ E $\frac{3}{5}$