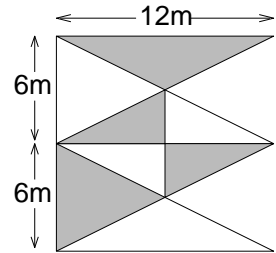


Angles and areas (Intermediate UKMT)

These questions must be attempted **without a calculator**

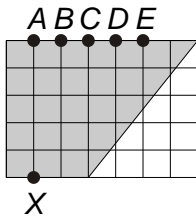
Topics covered in the questions below may not necessarily be from the topic of the title.

1. In square metres, what area of this pennant is shaded grey?



- A 50 B 54 C 57 D 60 E 72

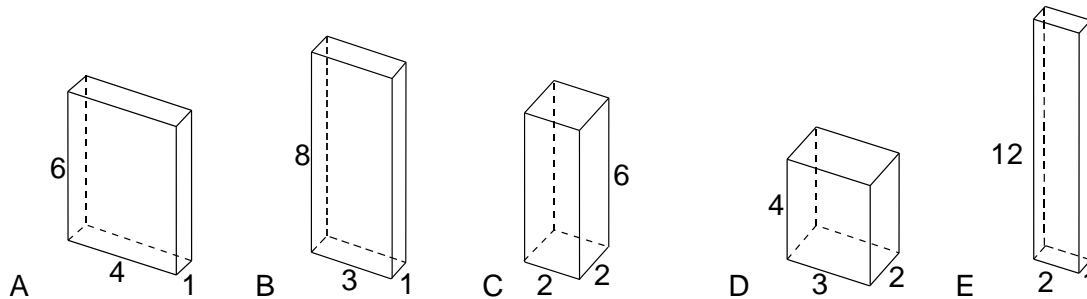
2. Which of the following straight lines cuts the shaded area in half?



- A XA B XB C XC D XD E XE

3. The cuboids below all have the same volume.

Which of them has the greatest surface area?



4. Starting at A, a point on a fixed circle with centre O, I first move anticlockwise one quarter of the way round the circle to a point W, hop across to X – the opposite end of the diameter through W, then travel one fifth of the way round the circle clockwise to the point Y before hopping across to Z, the point at the opposite end of the diameter through Y.

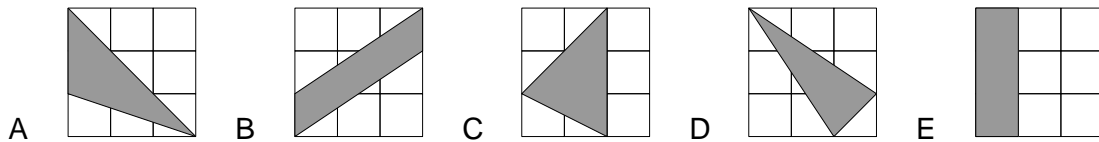
How big is $\angle AOZ$?

- A 18° B 22° C 162° D 198° E 270°

5. How large will an angle of $2\frac{1}{2}^\circ$ appear to be if you enlarge it by looking through a stack of five magnifying glasses, each one of which magnifies by a factor of 2?

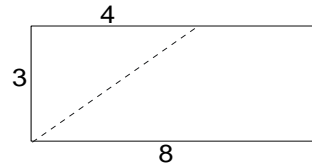
- A $2\frac{1}{2}^\circ$ B $12\frac{1}{2}^\circ$ C 25° D 40° E 80°

6. Which of the following shaded regions has an area different from the other shaded regions?



7. A 3×8 rectangle is cut into two pieces along the dotted line shown. The two pieces are then rearranged to form a right-angled triangle.

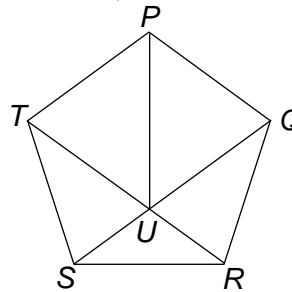
What is the perimeter of the triangle formed?



- A 21 B 22 C 23 D 24 E 25

8. The diagram shows a regular pentagon $PQRST$. The lines QS and RT meet at U .

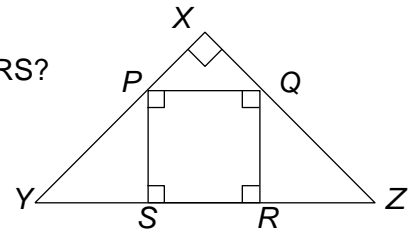
What is the size of angle PUR ?



- A 108° B 112° C 116° D 126° E 132°

9. The diagram shows a right-angled isosceles triangle XYZ which circumscribes a square $PQRS$.

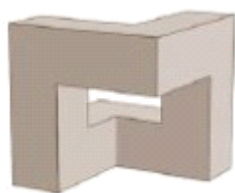
The area of triangle XYZ is x . What is the area of square $PQRS$?



- A $\frac{4x}{9}$ B $\frac{x}{2}$ C $\frac{4x}{5}$ D $\frac{2x}{5}$ E $\frac{2x}{3}$

10. The sculpture 'Cubo Vazado' [Emptied Cube] by the Brazilian artist Franz Weissmann is formed by removing cubical blocks from a solid cube to leave the symmetrical shape shown.

If all the edges have length 1, 2 or 3 units, what is the surface area of the sculpture in square units?



- A 36 B 42 C 48 D 54 E 60