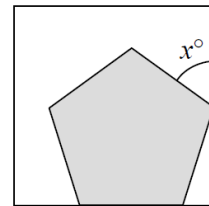# Maths Extension Questions.

The following questions are designed to do without a calculator and some of them are quite easy to do with a calculator. You must therefore show detailed reasoning and clearly show your working out and show that you could do them without a calculator.

1. What is the value of $1 - 0.2 + 0.03 - 0.004$?

   A 0.826   B 0.834   C 0.926   D 1.226   E 1.234

2. Last year, Australian Suzy Walsham won the annual women's race up the 1576 steps of the Empire State Building in New York for a record fifth time. Her winning time was 11 minutes 57 seconds. Approximately how many steps did she climb per minute?

   A 13   B 20   C 80   D 100   E 130

3. What is a half of a third, plus a third of a quarter, plus a quarter of a fifth?

   A $\dfrac{1}{1440}$ B $\dfrac{3}{38}$ C $\dfrac{1}{30}$ D $\dfrac{1}{3}$ E $\dfrac{3}{10}$

4. The diagram shows a regular pentagon inside a square.

   What is the value of x ?

   A 48   B 51   C 54   D 60   E 72

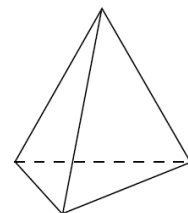
5. Which of the following numbers is not a square?

   A 1^6 B 2^5 C 3^4 D 4^3 E 5^2

6. The equilateral triangle and regular hexagon shown have perimeters of the same length.
   What is the ratio of the area of the triangle to the area of the hexagon?

   A $5:6$ B $4:5$ C $3:4$ D $2:3$ E $1:1$

7. A tetrahedron is a solid figure which has four faces, all of which are triangles.

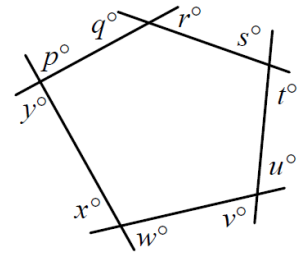   What is the product of the number of edges and the number of vertices of the tetrahedron?

   A 8   B 10   C 12   D 18   E 24

8. How many two-digit squares differ by 1 from a multiple of 10?

   A 1   B 2   C 3   D 4   E 5

9. What is the value of $p + q + r + s + t + u + v + w + x + y$ in the diagram?

   A 540   B 720   C 900   D 1080 E 1440

10. What is the remainder when $2^2 \times 3^3 \times 5^5 \times 7^7$ is divided by 8?

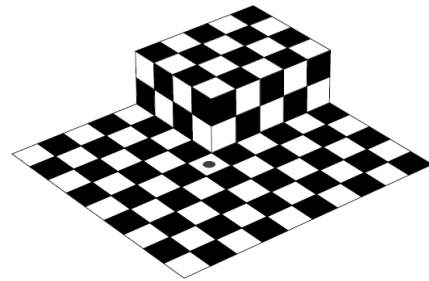   A 2   B 3   C 4   D 5   E 7

11. Three different positive integers have a mean of 7. What is the largest positive integer that could be one of them?
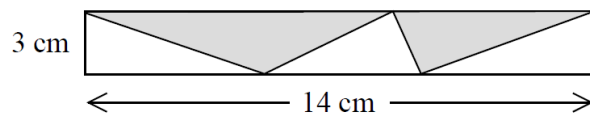
   A 15   B 16   C 17   D 18   E 19

12. An ant is on the square marked with a black dot. The ant moves across an edge from one square to an adjacent square four times and then stops.
    How many of the possible finishing squares are black?

   A 0   B 2   C 4   D 6   E 8

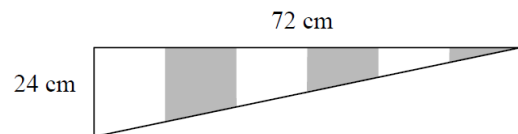13. What is the area of the shaded region in the rectangle?

   3 cm

   14 cm

   A 21 cm² B 22 cm² C 23 cm² D 24 cm² E more information needed

14. In a sequence, each term after the first two terms is the mean of all the terms which come before that term. The first term is 8 and the tenth term is 26. What is the second term?

   A 17   B 18   C 44   D 52   E 68

15. A flag is in the shape of a right-angled triangle, as shown, with the horizontal and vertical sides being of length 72 cm and 24 cm respectively. The flag is divided into 6 vertical stripes of equal width.
    What, in cm², is the difference between the areas of any two adjacent stripes?

   72 cm

   24 cm

   A 96   B 72   C 48   D 32   E 24