

SCHOOL: .....

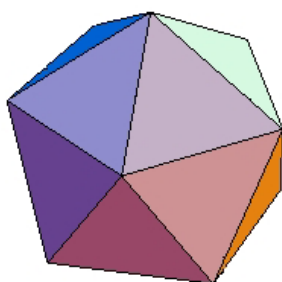
# Eastern Region Final Challenge 2010

## Round 1 (15 minutes) Pair A1

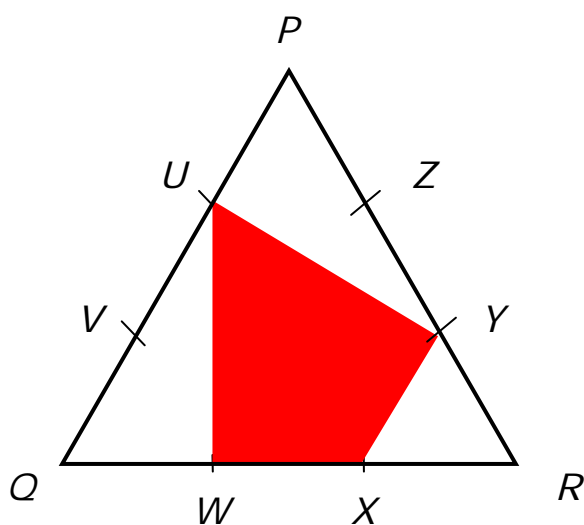
5 starters for 10

1. I bought 7 identical chocolate bars and got 8p change. How many pound coins did I give the cashier?

2. How many edges are there on this icosahedron altogether?




- 3.



PQR is an equilateral triangle.

The points U, V, W, X, Y and Z trisect the sides .

Find the ratio of the area of the shaded quadrilateral to the area of the whole equilateral triangle PQR.

4. Solve the equation  $\frac{x-2}{3} = 2x-14$

5. For the numbers: 1, 4, 9, 16 and  $x$ , find an integer  $x$  such that the *mean* equals the *median*.

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6. The population of *Smallville* at the end of 2007 was 5000.  
 During 2008 it increased by 10% and during 2009 it fell by 10%.  
 What was the population at the end of 2009?

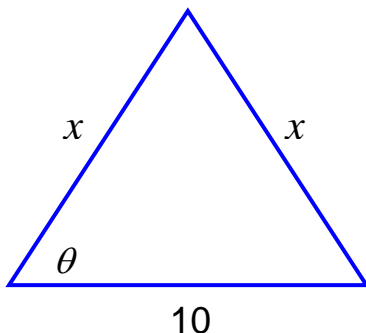
7. The sum of three different prime numbers is 40.  
 What is the difference between the  
 two biggest of these three numbers?

8. A cube with sides of length 6cm has a square hole of sides 3cm drilled through  
 from one face to the opposite face.

What is the volume of the remaining shape?

9. The area of the isosceles triangle is  $60 \text{ cm}^2$ .

What is the cosine of angle  $\theta$ ?




10. Given that 'HARDWORK' is 96% and 'KNOWLEDGE' is 94%,  
 then what percentage is 'ATTITUDE'?

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## Round 1 (15 minutes) Pair A2

### 5 starters for 10

11. The three angles of a triangle (measured in degrees) are all perfect squares.

What are they?

12. Find the value of  $x$ , a positive integer, given that:

$$x^2 + (x+1)^2 + (x+2)^2 + (x+3)^2 - (x+4)^2 - (x+5)^2 - (x+6)^2 = 0$$

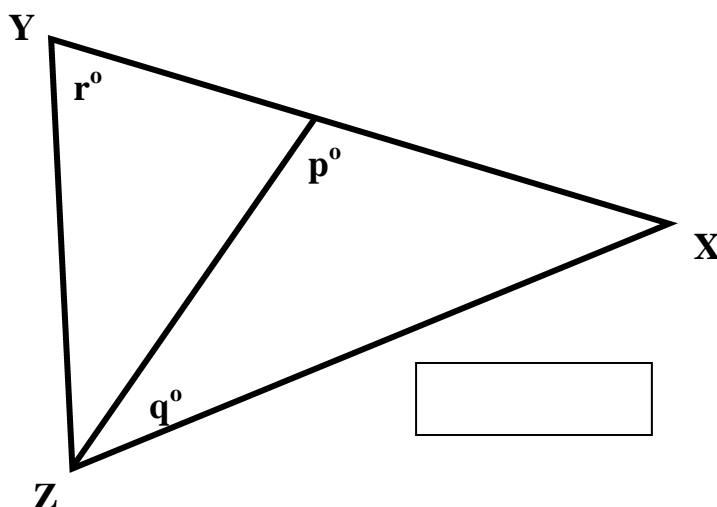
13. A fair coin is spun 4 times.

What is the probability of getting at least one head?

14. In the diagram, triangle XYZ

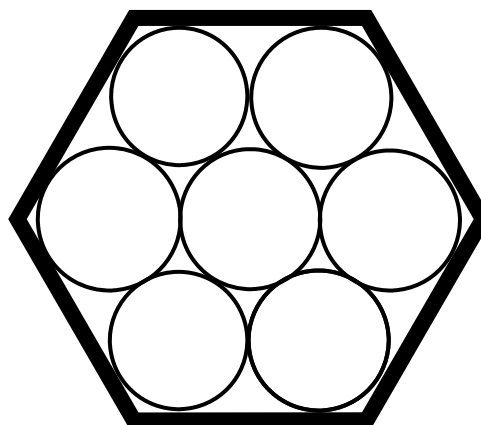
is isosceles with  $XY=XZ$ .

Express angle  $r$  in terms of  $p$  and  $q$




15. The diagram shows seven identical coins which fit exactly inside a wooden frame. As a result each coin is prevented from sliding.

What is the largest number of coins that may be removed one by one so that, at each stage, each remaining coin is still unable to slide.



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### Round 1 (15 minutes) Pair B2

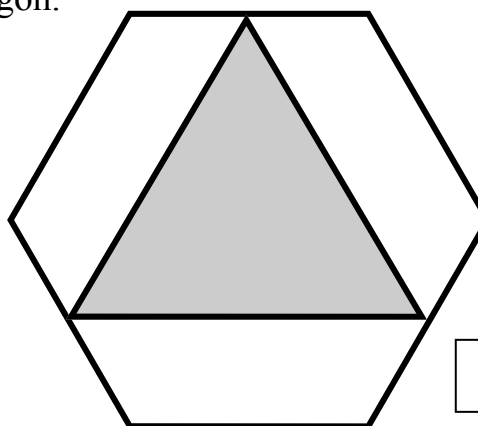
*5 starters for 10*

16. At a summer school, the ratio of boys to girls is 3:4 and the ratio of girls to adults is 5:7.  
 What is the ratio of children to adults?

17. Training by train from London to Edinburgh, I passed a sign saying “London 150 miles”. After 7 more miles, I passed another sign saying “Edinburgh 250 miles”. How far is it by train from Edinburgh to London?

18. The diagram shows an equilateral triangle with its corners at the mid-points of the alternate sides of a regular hexagon.

What fraction of the area of the hexagon is shaded?




19. A model of the Olympic Stadium is made on a scale of 1: 1000.  
 The playing area is 6600 m<sup>2</sup>.  
 What is the size of playing area on the model in square centimetres?

20. Four of these calculations give the same answer. Which is the odd one out?

$2 \times \sqrt{64}$

$22 - 2 \times 3$

$2^4$

$5^2 - 3^2$

$4 + 4 \times 2$