

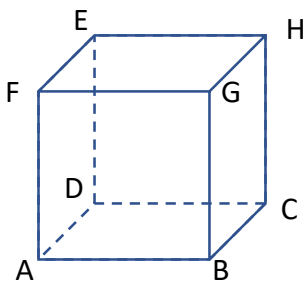
Here are 5 Christmas problems to solve!

1

Wrapping Paper Maths



A cuboid present and some of its measurements are outlined below.



AB = 10 cm  
AF = 14 cm  
FC = 30 cm

Calculate the least amount of wrapping paper needed to completely wrap the present. Give your answer in  $m^2$  to 3 significant figures.



2

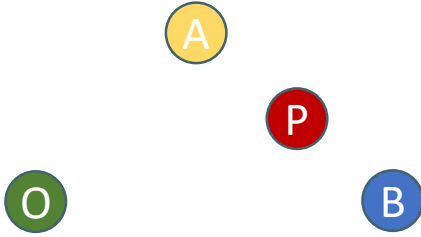
Christmas Probability

In the Hayes' Christmas card game, each player draws two cards consecutively from the pack. Once a card is drawn it is not replaced. There are 46 cards left in the pack when Emily starts her turn. Her mum has been counting cards and tells her that the probability that she draws two red cards is  $\frac{8}{69}$ .

What is the probability that Emily draws two black cards?

### Bauble Vectors

The diagram below shows where 4 baubles hang on a Christmas tree.



P is the point between A and B such that  $AP:PB = 5:3$ .

$$\vec{OA} = 2\mathbf{a}$$

$$\vec{OB} = 2\mathbf{b}$$

$$\vec{OP} = k(3\mathbf{a} + 5\mathbf{b})$$

Where  $k$  is a scalar quantity.

Find the value of  $k$ .

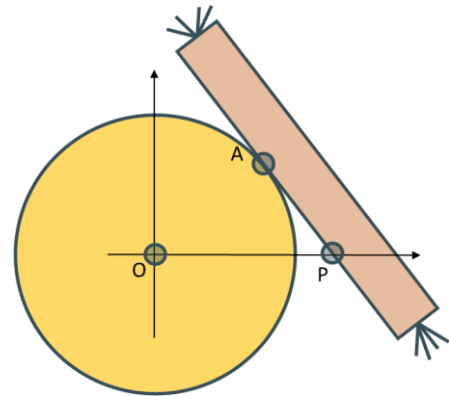
### Volume of Puddings

The volume of a hemi-spherical Christmas pudding is  $144\pi \text{ cm}^3$ . It is placed in a rectangular cuboid box which it fits exactly, the sides of the pudding touching the sides of the box.

Calculate the surface area of the box.

### Chocolate Geometry

Two chocolates from the chocolate tin land together, just touching at one point onto some graph paper Dr McCall has brought home with him. A diagram showing this is below:



The point where the two chocolates touch is  $(12,4)$

Dr McCall finds the equation of the circular chocolate is  $x^2 + y^2 = 160$

The lower line of the rectangular chocolate crosses the  $x$  - axis at P.

Find the area of the triangle OAP.

