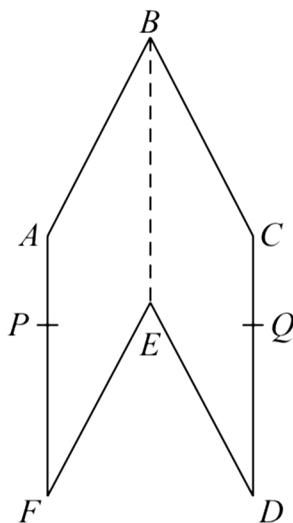


**Question 1 (5 Marks)**

The diagram shows a hexagon  $ABCDEF$ .



$ABEF$  and  $CBED$  are congruent parallelograms where  $AB = BC = x$  cm.  
 $P$  is the point on  $AF$  and  $Q$  is the point on  $CD$  such that  $BP = BQ = 10$  cm.

Given that angle  $ABC = 30^\circ$ ,

prove that  $\cos PBQ = 1 - \frac{(2 - \sqrt{3})}{200}x^2$

**Question 2 (5 Marks)**

Here are the first five terms of a geometric sequence.

$$\sqrt{5} \quad 10 \quad 20\sqrt{5} \quad 200 \quad 400\sqrt{5}$$

(a) Work out the next term of the sequence.

.....  
(2)

The 4th term of a different geometric sequence is  $\frac{5\sqrt{2}}{4}$

The 6th term of this sequence is  $\frac{5\sqrt{2}}{8}$

Given that the terms of this sequence are all positive,

(b) work out the first term of this sequence.

You must show all your working.

.....  
(3)

**Question 3 (5 Marks)**

There are only  $r$  red counters and  $g$  green counters in a bag.

A counter is taken at random from the bag.

The probability that the counter is green is  $\frac{3}{7}$

The counter is put back in the bag.

2 more red counters and 3 more green counters are put in the bag.

A counter is taken at random from the bag.

The probability that the counter is green is  $\frac{6}{13}$

Find the number of red counters and the number of green counters that were in the bag originally.

red counters.....

green counters.....

**(Total 15 Marks)**