MIXED REVISION
CHAPTERS 4 • 5 • 6

2

Multiple choice

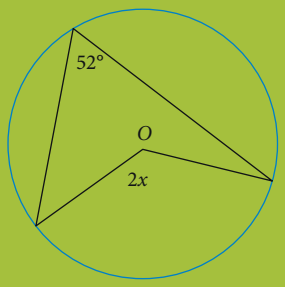
1 The projection of $\mathbf{q} = 5\mathbf{i} + 3\mathbf{j}$ on the positive direction of the x-axis is:

A -5 B 0 C 3 D 5 E $3\sqrt{5}$

2 How many different committees of 4 people can you select from 15 people?

A 1365 B 2730 C 32 760 D 50 625 E 360 360

3 In the diagram, O is the centre of the circle.



What is the value of x?

A 26° B 52° C 76° D 104° E 208°

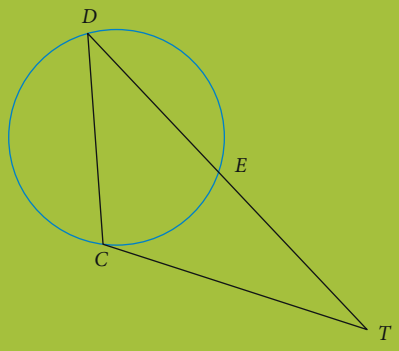
4 The projection of $\mathbf{a} = (4, 155°)$ on $\mathbf{b} = (2, 335°)$ is:

A -4 B -2 C 2 D 4 E 6

5 What is the value of ${}^{10}C_4$?

A 210 B 400 C 5040 D 10 000 E 151 200

6 In the diagram, CT is a tangent. Choose the correct statement.



A $CT^2 = DE \times ET$ B $CT^2 = CD \times ET$ C $CT^2 = DE \times DT$
D $CT^2 = CD \times DE$ E $CT^2 = DT \times ET$

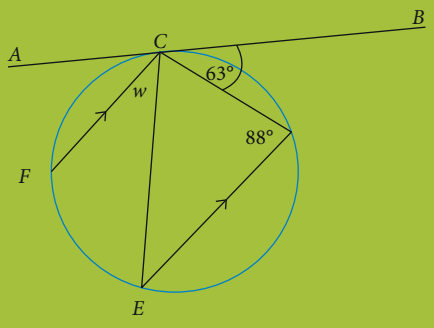
7 An aeroplane is flying toward the northwest. Which of the following wind velocity vectors increases the plane's speed the most?

A $\mathbf{w}_1 = -\mathbf{i} - 5\mathbf{j}$ B $\mathbf{w}_2 = -5\mathbf{j}$ C $\mathbf{w}_3 = \mathbf{i} + 5\mathbf{j}$
D $\mathbf{w}_4 = 5\mathbf{i} + \mathbf{j}$ E $\mathbf{w}_5 = -\mathbf{i} + 5\mathbf{j}$

8 What is the probability of selecting 3 brass screws at random from a box containing 12 brass and 8 zinc-plated screws of the same size?

A $\frac{1}{1140}$ B $\frac{1}{220}$ C $\frac{14}{285}$ D $\frac{14}{55}$ E $\frac{11}{57}$

9 In the diagram, *ACB* is a tangent. The value of *w* is:



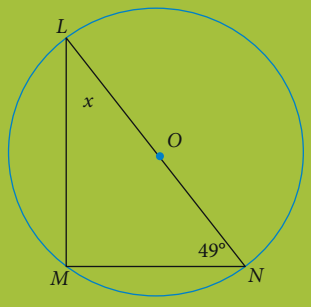
A 25° B 63° C 88° D 92° E none of the above

Short answer

1 Calculate the dot products of each of the following.
a (−2, 4) and (3, 5)
b (5, 84°) and (7, 122°), correct to two decimal places

2 Of the little cakes in a baker's shop, 70 have cream, 80 have custard and 90 have a dusting of icing sugar. 25 have both custard and cream, 35 have cream and icing sugar and 50 have custard and icing sugar. There are 150 little cakes for sale altogether and all have cream, custard or cream or icing sugar. Do any have all three of custard, cream and icing sugar, and if so, how many?

3 Find the value of *x* giving reasons. *O* is the centre of the circle.

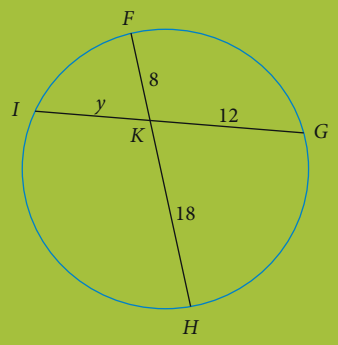


4 Find the projection of $\mathbf{p} = (1, 5)$ on $\mathbf{q} = (6, 3)$.

5 At an international sports event, 18 of the athletes from North America, 25 from Europe, 8 from Australia, 13 from Africa, 15 from South America and 20 from Asia are in the dining hall. What is the probability that three athletes chosen at random are all from the Americas?

9780170250276

6 Find the value of y in the diagram below. Explain your reasoning.



Application

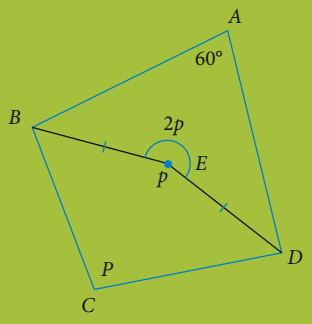
1 Consider the points $A(-5, -1)$, $B(2, -3)$ and $C(2, 6)$, which are the end points of vectors **BA** and **BC**. Use vectors to calculate the angle between **BA** and **BC**.

2 The wind is blowing in the direction N 20° E and a yacht is moving on a bearing of 340° at a speed of 8 m s^{-1}. If the wind is exerting a force of 5000 N on the sails, use the scalar product to find the energy transferred in one minute. Remember that the work done (using $\mathbf{F} \cdot \mathbf{s}$), is the energy transferred.

3 A jar contains a mixture of 10 sherbies, 12 milk chews and 8 chocolate eclairs. What is the probability that in a handful of 6 lollies taken out at random, there are equal numbers of each?

4 How many numbers from 2000 to 6000 inclusive are divisible by 4, 5 or 6?

5 Consider the quadrilateral $ABCD$, where E is an internal point such that $EB = ED$.
Prove that $ABCD$ is a cyclic quadrilateral.



6 Consider the diagram where PQ, QR and RP are tangents to the circle, with points of contact U, V and W respectively. $PU = x$ cm and $QV = y$ cm. $VR = 20$ cm and $x + y = 16$.
Find the perimeter of $\triangle PQR$.