1 MIXED REVISION
CHAPTERS 1 • 2 • 3

Multiple choice

1 The direction of the vector $(-3, 7)$ is about:
A $-113°$ B $-67°$ C $67°$ D $113°$ E $247°$

2 What is the contrapositive to the statement?
'*People with an X and a Y sex chromosome are male*'?
A *People with two X chromosomes are female*
B *People who do not have an X and a Y chromosome are female*
C *Males have an X and a Y chromosome*
D *Females do not have an X and a Y chromosome*
E *People who are not male do not have an X and a Y chromosome*

3 A bag contains 12 identical beads, of which 6 are green, 2 are black and 4 are red. How many ways can you put all the beads in a line?
A 576 B 11 880 C 13 860 D 27 720 E 479 001 600

4 If $\mathbf{m} = 3\mathbf{i} - 4\mathbf{j}$, which of the following vectors is in the opposite direction to $\mathbf{m}$?
A $1.5\mathbf{i} - 2\mathbf{j}$ B $(-9, 12)$ C $6\mathbf{i} + 8\mathbf{j}$ D $(-4, 3)$ E $\begin{bmatrix} 4 \\ 3 \end{bmatrix}$

5 The mathematical statement $C \Rightarrow B$ means
A B is a necessary and sufficient condition for C
B C is a necessary condition for B
C C is a sufficient condition for B
D B if and only if C
E If B is true, then C must also be true

6 What is the value of ${}^{10}P_3$?
A 30 B 120 C 720 D 1000 E 604 800

7 A golf ball is thrown from a height of 1.7 m at a brick wall 3.5 m from the thrower. The ball rebounds and is caught at a height of 1.5 m by the thrower who has remained stationary. The displacement of the ball is:
A 0 B 20 cm C 1.5 m D 1.7 m E 3.5 m

8 Which of the following is a counter example to the statement?
'*The time is earlier in all countries to the west of Jamaica*'?
A Honduras is to Jamaica's west and its time is 1 hour earlier than Jamaica's
B Jamaica's time is 3 hours later than Vancouver's (in Canada), which is to its west
C Australia is to the west of Jamaica and its time is 15 hours later than Jamaica's
D Britain is to Jamaica's east and its time is 4 hours later than Jamaica's
E Jamaica is west of Latvia and Latvia's time is 8 hours later than Jamaica's

9 A product key has 2 letters followed by 3 digits. How many different product keys are possible?
A 260 B 39 000 C 58 500 D 676 000 E 936 000

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Short answer

1 Convert the vector (3, –8) to polar form.

2 Give counter examples for each of the following statements.
   a All mammals have four legs.
   b The square of a number is always larger than the number.
   c A quadrilateral with a right-angle must be a rectangle.

3 A customer at an organic produce shop is buying ripe peaches, apricots and mangoes. Her basket has three compartments that can hold 6 peaches, 10 apricots and 4 mangoes without squashing them. Her children have to pick individual fruit out for her, and she puts them in the basket or tells the child to take it back.
   a How many items *must* she put in to ensure at least one compartment is full?
   b If the fruit are put into the basket in random order, what is the probability that the first 3 she puts in will be apricots?

4 Find the resultant of $\mathbf{a} = (8, -7)$ and $\mathbf{b} = -6\mathbf{i} + 11\mathbf{j}$.

5 Give examples to show the difference between inductive and deductive logic.

6 How many four letter words can be made from the letters of SIGNATURE if one of the centre letters must be a vowel?

Application

1 A boat travels 75 km north-east and then 48 km in the direction N 60° W. Find the displacement of the boat as a vector in polar form.

2 The velocity of a boat changes from 32 knots at N 25° E to 24 knots at a bearing of 113°. Calculate the change in velocity.

3 Joeline asserted that the formula $x^2 + x + 11$ always gives a prime number. Prove that she is wrong.

4 Prove that the diagonals of a rhombus intersect at right angles.

5 Of the 23 students in a class, 2 are called Elizabeth, 2 are called Michael and 3 are called Ben. What is the probability that if the students leave the classroom in random order, the Elizabeths, Michaels and Bens are first out the door?

6 In Chess competitions, players score 1 point for a win, $\frac{1}{2}$ a point for a draw and no points for a loss. The Doeberl Cup is played over the Easter long weekend in Canberra and the Major division has 7 rounds. Like most Chess competitions, players participate in every round and are paired using the Swiss system. Commonly, the winner has a final score of $5\frac{1}{2}$. This means that it is *possible* for someone to win the tournament after losing their first game! What is the probability that in a year where the winner did have a score of $5\frac{1}{2}$, the winner lost his/her first game?