YEAR 11 PHYSICS

MOVING ABOUT

LESSON 1: SCALARS & VECTORS
PART A: MULTIPLE CHOICE QUESTIONS

QUESTION 1.
Which of the following defines a scalar quantity?
(a) Magnitude only
(b) Magnitude and direction
(c) Direction
(d) None of the above

QUESTION 2.
Which of the following is an example of a vector quantity?
(a) Distance
(b) Mass
(c) Speed
(d) Momentum

QUESTION 3.
A ball is pulled in opposite directions by three separate forces, as shown in the vector diagram below. What is the resultant force acting on the ball?

(a) 190 N
(b) 10 N to the right
(c) 10 N to the left
(d) Cannot be calculated as they are separate forces
QUESTION 4.
What is the resultant of a 4 N force acting upward and a 3 N force acting horizontally?
(a) 1 N
(b) 5 N
(c) 7 N
(d) 12 N

QUESTION 5.
A bird flies 50 km south and then 20 km east. What is the total distance travelled by the bird?
(a) 2900 km
(b) 53.85 km
(c) 70 km
(d) 53.85 km S 21° 48’ E

QUESTION 6.
Suppose that an object travels from one point in space to another. Which of the following statements is correct?
(a) The displacement is either greater than or equal to the distance travelled.
(b) The displacement is always equal to the distance travelled.
(c) The displacement is either less than or equal to the distance travelled.
(d) The displacement can be either greater than, less than, or equal to the distance travelled.

QUESTION 7.
A man walks 8 km north and then 5 km in a direction N30°E. What is his resultant displacement from his starting point?
(a) 11 km
(b) 12 km
(c) 13 km
(d) 14 km
QUESTION 8.
A plane flies a distance of 150 m at a direction N45ºE, then alters its direction by 90º as shown in the diagram below. If it covers another 150 m in this direction, what is the resultant displacement?

(a) Zero
(b) 212 m towards the East
(c) 212 m towards the West
(d) 150 m S45ºE
PART B: SHORT ANSWER QUESTIONS

QUESTION 9.
Find the sum of the following vectors.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Correct magnitude AND direction of the resultant vector with units</td>
<td>1</td>
</tr>
</tbody>
</table>

(a) 30 km North + 40 km South  

(b) 15 Newtons East + 15 Newtons West  

(c) 20 m North + 20 m West  

(d) Acceleration of 30 ms$^{-2}$ West + 40 ms$^{-2}$ South  

(e) Momentum of 20 kgms$^{-1}$ N20°E + Momentum of 20 kgms$^{-1}$ N70°W
QUESTION 10.

Find the resultant of the following combinations of vectors.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct magnitude AND direction of the resultant vector with units</td>
<td>1</td>
</tr>
</tbody>
</table>

(a) 26 m West – 15 m East

(b) 15 ms\(^{-1}\) South – 24 ms\(^{-1}\) North

(c) 20 m North + 20 m West

(d) Acceleration of 30 ms\(^{-2}\) East – 40 ms\(^{-2}\) South
QUESTION 11.

For each of these diagrams, determine the magnitude of the components $v_x$ and $v_y$.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Correct magnitude of vectors in BOTH the x and y directions.</td>
<td>1</td>
</tr>
</tbody>
</table>

(a)  

(b)  

(c)  

(d)  

200

50°
QUESTION 12.

The vector diagram below represents the velocities of three cars (all in ms⁻¹).

\[ x = 3 \quad y = 4 \quad z = 5 \]

45°

Draw a vector diagram to determine the resultant velocity.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Correct magnitude of vector with units.</td>
<td>2</td>
</tr>
<tr>
<td>• Correct direction of vector.</td>
<td></td>
</tr>
<tr>
<td>• Diagram drawn.</td>
<td></td>
</tr>
<tr>
<td>• EITHER correct magnitude of vector OR direction.</td>
<td>1</td>
</tr>
<tr>
<td>• Diagram drawn.</td>
<td></td>
</tr>
</tbody>
</table>

(a) \( x + y \) 2

(b) \( x + z \) 2

(c) \( y + z \) 2
(d) \( x - y \)

(e) \( x - z \)

(f) \( y - z \)

(g) \( y - x \)
QUESTION 13.
As shown in the diagram below, an object moves from P to S by the following steps:
- 4 m horizontally to the left from P to Q
- 4 m vertically down from Q to R
- 7 m horizontally to the right from R to S

Determine the magnitude of the displacement of S from P. Show working.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Correct magnitude of displacement calculated.</td>
<td></td>
</tr>
<tr>
<td>• Calculations and working out present.</td>
<td>2</td>
</tr>
</tbody>
</table>
QUESTION 14.
Andrew decides to go for a drive. It takes him 10 minutes to drive 6 km east, then 3 minutes to drive 2 km south, then another 3 minutes to drive 4 km west.

(a) Draw a diagram to represent his journey.

(b) What is his total distance travelled?

(c) What was his displacement after 13 minutes?

(d) What was his displacement at the end of his journey?
QUESTION 15.
A basketball is passed from the northern goal to the southern goal in four throws. Each throw covers a distance of 8.5 m.

(a) What is the distance travelled by the ball?  
___________________________________________________________________

(b) What is the magnitude of the total displacement of the ball in metres?  
___________________________________________________________________

(c) Explain the difference in answers in part (a) and (b).  
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________

15 m  
28 m  
N