

حل أسئلة درس الموقع والزمن



تم تحميل هذا الملف من موقع المناهج الإماراتية

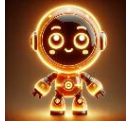
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المزيد من مادة
فيزياء:

التواصل الاجتماعي بحسب الصف التاسع



صفحة المناهج
الإماراتية على
فيسبوك

المزيد من الملفات بحسب الصف التاسع والمادة فيزياء في الفصل الأول

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GRADE 9 PHYSICS — WORKSHEET SOLUTIONS

Unit 2, Lesson 2: Position and Time | Complete Answer Key & Solutions

Student Name: _____

Grade: Grade 9 Physics

Date: _____

Key Physics Principles: Position, Vectors & Displacement

- **Coordinate System:** Defines the origin (where all coordinates = 0) and the positive/negative directions.
- **Scalars vs. Vectors:** Scalar quantities have magnitude only (e.g., time, mass, distance, temperature). Vector quantities have both magnitude and direction (e.g., position, displacement, velocity, acceleration, force, weight).
- **Distance (d):** Total path length travelled (scalar, always positive).
- **Displacement (Δx):** Shortest straight-line change in position: $\Delta x = x_f - x_i$ (vector, positive or negative).
- **Vector Addition:** Vectors in the same direction add magnitudes; vectors in opposite directions subtract magnitudes.

Q1. The figure represents two vectors: the first has a magnitude of 8 m pointing East, and the second has a magnitude of 5 m pointing West. What is the sum of these two vectors?

A. 3 m West

B. 13 m West

C. 3 m East

D. 13 m East

Detailed Solution & Scientific Reasoning:

Correct Answer: C. 3 m East**Detailed Reasoning:** Taking East as positive (+):

Vector 1 = +8 m (East), Vector 2 = -5 m (West).

Resultant Vector $R = +8\text{ m} - 5\text{ m} = +3\text{ m}$ (3 m East).

Q2. Adam began his motion at point A, passing through points B (3 m North), C (5 m East), and D (3 m South) before returning to point A (5 m West). What are the displacement and the total distance travelled by Adam?

A. Displacement = 16 m | Distance = 16 m

B. Displacement = 0 m | Distance = 16 m

C. Displacement = 34 m | Distance = 34 m

D. Displacement = 0 m | Distance = 34 m

Detailed Solution & Scientific Reasoning:

Correct Answer: B. Displacement = 0 m | Distance = 16 m**Detailed Reasoning:**1. **Total Distance:** Sum of all segments = 3 m + 5 m + 3 m + 5 m = **16 m**.2. **Displacement:** Since Adam returns to his exact initial starting position A, $x_f = x_i$, so **Displacement $\Delta x = 0\text{ m}$** .

Q3. Which of the following physical quantities is classified as a scalar quantity?

A. Force

B. Displacement

C. Acceleration

D. Time

Detailed Solution & Scientific Reasoning:

Correct Answer: D. Time**Detailed Reasoning:** Scalar quantities require magnitude only without direction. Time (seconds) is scalar, whereas force, displacement, and acceleration are all vector quantities requiring both magnitude and direction.

**Q4. What feature of a drawn vector arrow represents its magnitude?**

- A. The colour of the vector
B. The direction of the arrow
C. The length of the vector arrow
D. The line thickness of the arrow

Detailed Solution & Scientific Reasoning:**Correct Answer:** C. The length of the vector arrow**Detailed Reasoning:** In vector diagrams, the **length** of the drawn vector arrow is directly proportional to its magnitude.**Q5. The mathematical result of subtracting the initial position from the final position ($x_f - x_i$) is called the:**

- A. Displacement**
B. Time interval
C. Average speed
D. Motion diagram

Detailed Solution & Scientific Reasoning:**Correct Answer:** A. Displacement**Detailed Reasoning:** Displacement is defined as the change in position of an object, given by the formula $\Delta x = x_f - x_i$.**Q6. Arwa walked from her house to school (a distance of 300 m), and then returned home along the same path. Which statement is correct?**

- A. Displacement equals twice the distance
B. Displacement equals zero
C. Distance is a vector quantity
D. Distance equals displacement

Detailed Solution & Scientific Reasoning:**Correct Answer:** B. Displacement equals zero**Detailed Reasoning:** Arwa returned to her initial starting point (her house). Therefore, $x_f = x_i$, so $\Delta x = 0$ m. (Note: Total distance travelled = 300 m + 300 m = 600 m).**Q7. Which of the following points always has a value of zero for every coordinate in a Cartesian coordinate system?**

- A. The origin point**
B. The position point
C. The magnitude of the resultant
D. The length of the vector

Detailed Solution & Scientific Reasoning:**Correct Answer:** A. The origin point**Detailed Reasoning:** The origin is defined as the reference point where all coordinate axes intersect, specified by ($x = 0$, $y = 0$).**Q8. Arwa moved a distance of 150 m to the East, then turned around and moved a distance of 50 m to the West. Calculate Arwa's displacement.****Detailed Solution & Scientific Reasoning:****Detailed Calculation & Solution:**

Taking East as positive (+):

- Vector 1 (East) = +150 m
- Vector 2 (West) = -50 m
- Displacement $\Delta x = +150 \text{ m} - 50 \text{ m} = +100 \text{ m East}$ (100 m to the East).





Q9. A toy car moves along a straight line, with a time interval of 0.20 s between successive strobe dots. Position 's' is at 0 cm and position 'c' is at 80 cm (East). What are the elapsed time and displacement between 's' and 'c'?

- A. Time = 0.40 s | Displacement = 43 cm East B. Time = 0.40 s | Displacement = 43 cm West
C. Time = 0.80 s | Displacement = 80 cm East D. Time = 0.80 s | Displacement = 80 cm West

Detailed Solution & Scientific Reasoning:

Correct Answer: C. Time = 0.80 s | Displacement = 80 cm East

Detailed Reasoning:

- Displacement:** $\Delta x = x_c - x_s = 80 \text{ cm} - 0 \text{ cm} = +80 \text{ cm East}$.
- Time Interval:** 4 strobe intervals $\times$ 0.20 s/interval = **0.80 s**.

Q10. A toy car moves from position 's' at 80 cm to position 'e' at 0 cm (West). The time interval between successive images is 0.10 s (2 intervals total). What are the elapsed time and displacement?

- A. Time = 0.20 s | Displacement = 80 cm to the West** B. Time = 0.10 s | Displacement = 70 cm to the Right
 C. Time = 0.20 s | Displacement = 80 cm to the Right D. Time = 0.30 s | Displacement = 70 cm to the Right

Detailed Solution & Scientific Reasoning:

Correct Answer: A. Time = 0.20 s | Displacement = 80 cm to the West

Detailed Reasoning:

- Displacement:** $\Delta x = x_e - x_s = 0 \text{ cm} - 80 \text{ cm} = -80 \text{ cm (80 cm to the West)}$.
- Elapsed Time:** 2 intervals $\times$ 0.10 s/interval = **0.20 s**.

Q11. A toy car starts at position 0 cm and moves East. The time interval between successive images is 0.20 s. What is the displacement of the car at $t = 0.60 \text{ s}$ (after 3 time intervals to 60 cm)?

- A. +60 cm** B. +80 cm
 C. -60 cm D. -80 cm

Detailed Solution & Scientific Reasoning:

Correct Answer: A. +60 cm

Detailed Reasoning: At $t = 0.60 \text{ s}$, 3 time intervals of 0.20 s have passed. Moving 20 cm per interval from 0 cm gives position $x_f = +60 \text{ cm}$. Thus $\Delta x = +60 \text{ cm}$.

Q12. In a position line diagram, a toy car moves from initial position (3 m) to final position (8 m). Which statement is correct?

- A. $x_f = +3 \text{ m}$ B. $\Delta x = +3 \text{ m}$
 C. $v_i = +3 \text{ m}$ **D. $x_i = +3 \text{ m}$**

Detailed Solution & Scientific Reasoning:

Correct Answer: D. $x_i = +3 \text{ m}$

Detailed Reasoning: The car starts its motion at 3 m, so the initial position $x_i = +3 \text{ m}$. (Final position $x_f = +8 \text{ m}$, and displacement $\Delta x = 8 - 3 = +5 \text{ m}$).





Q13. Arwa begins her motion at position $x_1 = 30$ m and moves to the left until she reaches position $x_2 = 10$ m. What is Arwa's displacement?

A. -10 m

B. -20 m

C. +20 m

D. +40 m

Detailed Solution & Scientific Reasoning:

Correct Answer: B. -20 m

Detailed Reasoning:

Displacement $\Delta x = x_f - x_i = 10 \text{ m} - 30 \text{ m} = -20 \text{ m}$ (20 m to the left).

Q14. Which of the following statements regarding the graphical representation of vectors is correct?

A. A vector must be drawn to solve every physics problem

B. The length of a vector should be directly proportional to its magnitude

C. Every physical quantity in physics is a vector

D. A vector is a quantity with magnitude but no direction

Detailed Solution & Scientific Reasoning:

Correct Answer: B. The length of a vector should be directly proportional to its magnitude

Detailed Reasoning: Vector scale diagrams require the arrow length to be drawn proportional to the vector's magnitude.

Q15. An object moves from initial position $x_i = 4.0$ m to final position $x_f = 1.0$ m (leftward arrow). What is the magnitude of the object's displacement?

A. 5 m

B. 4 m

C. 3 m

D. 0 m

Detailed Solution & Scientific Reasoning:

Correct Answer: C. 3 m

Detailed Reasoning:

Displacement $\Delta x = x_f - x_i = 1.0 \text{ m} - 4.0 \text{ m} = -3.0 \text{ m}$.

The **magnitude** of displacement $|\Delta x| = 3.0 \text{ m}$ (3 m).

Q16. In the same figure (motion along a straight line from 4.0 m to 1.0 m), what is the magnitude of the total distance travelled by the object?

A. 5 m

B. 4 m

C. 3 m

D. 0 m

Detailed Solution & Scientific Reasoning:

Correct Answer: C. 3 m

Detailed Reasoning: For straight-line motion in one direction without reversing, the total distance travelled equals the magnitude of displacement = 3 m.



Q17. An object moves 10 m from point A to point B, and then immediately turns around and returns to point A along the same path. What is the magnitude of the object's displacement?

- A. 100 m
B. 20 m
C. 10 m
D. 0 m

Detailed Solution & Scientific Reasoning:

Correct Answer: D. 0 m

Detailed Reasoning: Because the object returns to its exact starting point A, $x_f = x_i$. Therefore, **Displacement $\Delta x = 0$ m.**

Q18. In the same motion scenario (moving 10 m from A to B and returning 10 m from B to A), what is the magnitude of the total distance travelled?

- A. 100 m
B. 20 m
C. 10 m
D. 0 m

Detailed Solution & Scientific Reasoning:

Correct Answer: B. 20 m

Detailed Reasoning: Distance is the total path length travelled = 10 m (forward) + 10 m (return) = **20 m.**

Q19. A car moves 20 km to the East, then 30 km to the West. Calculate:

- (a) the displacement of the car,
(b) the total distance travelled by the car.

Detailed Solution & Scientific Reasoning:

Detailed Solutions:

Taking East as positive (+):

(a) **Displacement:** $\Delta x = +20 \text{ km} - 30 \text{ km} = -10 \text{ km}$ (10 km to the West).

(b) **Total Distance:** $d = 20 \text{ km} + 30 \text{ km} = 50 \text{ km}.$

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