Science 10

PROVINCIAL EXAM STUDY BOOKLET

Unit 3

Physics/Motion

Student Instructions

1. Ensure that you have **blank paper** and a **Data Booklet**.

2. Record all answers on a separate piece of paper.

3. Answer keys are provided by your teacher.

4. When you have finished with this **Study Booklet** please return it to your teacher.

Make **NO MARKS** on this study booklet!

1. Which of the following is an appropriate unit for velocity?
    A. s   B. m   C. m/s^2 D. km/h

2. The following distance-time graph shows a 100m race among three friends.

What was the outcome of the race?
    A. Al won the race.   B. Bob won the race.
    C. Charlie won the race.   D. The race was a three-way tie.

Use the following information to answer the next two questions.
The data represents the motion of a girl riding her skateboard along a smooth, pedestrian-free sidewalk. You may find it useful to graph the data in the table on the grid provided.

Position vs. Time

Time (s)	Position (m)
0	0
2	3.0
4	6.0
6	9.0

3. What does the slope of the line represent?
    A. the distance the skateboarder travelled
    B. the average velocity of the skateboarder
    C. the path taken by the skateboarder, as she is moving up a hill
    D. the most likely positions of the skateboarder at the times between the recorded data points

4. How far did the girl move during 3 s?
    A. 3.0m   B. 4.5m   C. 6.0m   D. 9.0m

5. Which of the following statements describe the relationship among displacement, time interval and average velocity for an object travelling in uniform motion?

I	When Δd gets larger and Δt is constant, the average velocity get larger.
II	When Δt gets larger and Δd is constant, the average velocity gets smaller.
III	When v_{av}

   A. I and II only   B. I and III only   C. II and III only   D. I, II and III

6. The following graph shows the velocity of a taxi as it travels to the airport.
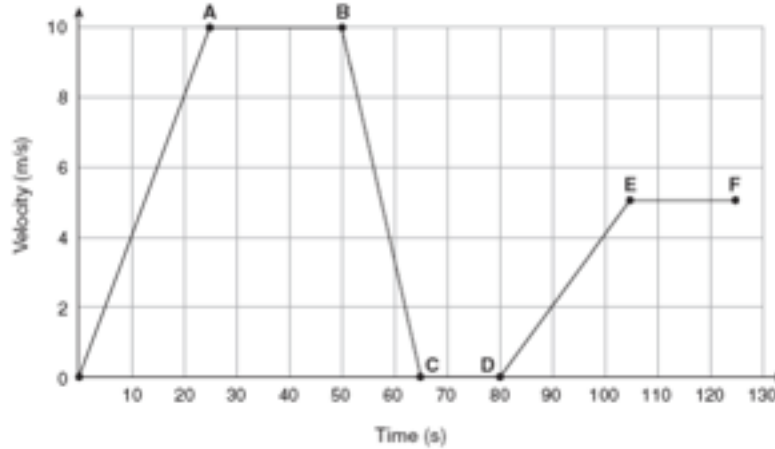
During which interval of the journey is the taxi stopped?
    A. from point A → point B   B. from point B → point C
    C. from point C → point D   D. from point D → point E

Use the following information for a car moving with constant acceleration to answer the next 3 questions.
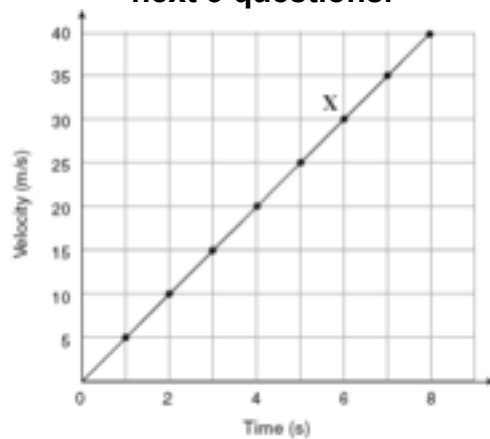
7.   The car has negative acceleration.
    A. The statement is supported by the information given.
    B. The statement is refuted by the information given.
    C. The statement is neither supported nor refuted by the information.

8.   Every second, the velocity of the car increases by 5m/s.
    A. The statement is supported by the information given.
    B. The statement is refuted by the information given
    C. The statement is neither supported nor refuted by the information.

9. The velocity of the car at **X** is 5m/s.
   A. The statement is supported by the information given.
   B. The statement is refuted by the information given
   C. The statement is neither supported nor refuted by the information.

**Use the following information to answer the question.**
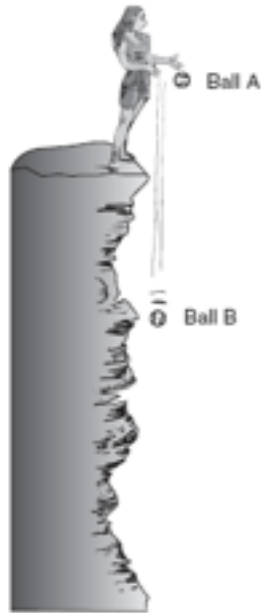
Ball A

Ball B

- A student holds two identical tennis balls at the same height above a cliff.
- She releases Ball A one second after Ball B.
- Each ball is in the air for three seconds.
- Assume no friction.

10. Which of the following statements are supported by the diagram and experiment?

I	The balls fall with the same acceleration
II	Each ball's velocity increases as it falls.
III	As they fall, the distance between the balls increases.

A. I only   B. I and II only   C. II and III only   D. I, II and III

11. A Grand Prix race car changes its velocity from 0 km/h to 160 km/h in 2.5 s. Which of the following describes the motion of the car?
   A. uniform motion   B. zero acceleration
   C. positive acceleration   D. negative acceleration

12. A car accelerates from rest at a constant 5 m/s².
   How long will it take the car to reach 10 m/s?
   A. 2 s   B. 5 s   C. 10 s   D. 50 s

13. A motorist travels at 2 m/s and then acclerates at a rate of 6 m/s² for 3 s.
   What is the final velocity of the car?
   A. 2 m/s   B. 6 m/s   C. 8 m/s   D. 20 m/s

14. Which of the following symbols represents a change in quantity?
   A. α B. β C. Υ D. Δ

**Use the following position vs. time graph to answer the next question.**
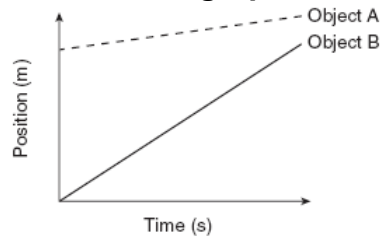
15. Which of the following describes the situation shown above?
    A. Object B has a lower velocity.
    B. Object B has a higher velocity.
    C. Both objects travelled the same distance.
    D. Both objects started at the same location.

Use the following position vs. time graph to answer the next question.
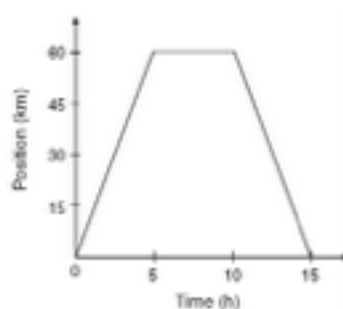
16. What distance is travelled in the first 15 hours?
    A. 0 km   B. 60 km   C. 120 km   D. 180 km

Use the following position vs. time graph to answer question 17.
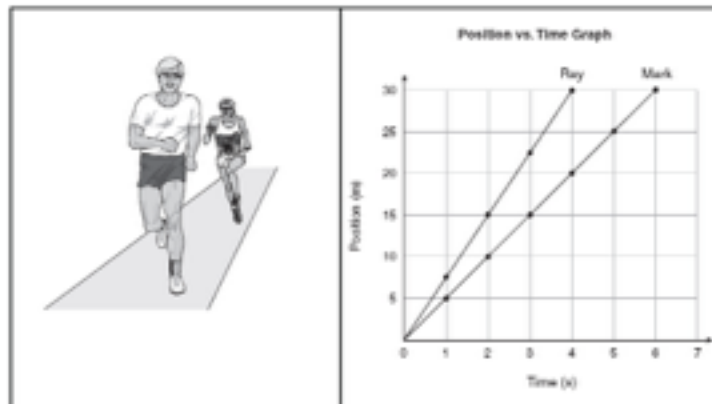
17. Ray and Mark are running on a track and a sample of their progress is plotted on a graph. Which of the following statements are supported by the graph?

I	Ray is running faster than Mark.
II	Mark runs farther than Ray during the same time interval.
III	Ray has a greater displacement during each time interval than Mark.

A. I only   B. III only   C. I and II only   D. I and III only

Use the following position vs. time graph to answer the next question.
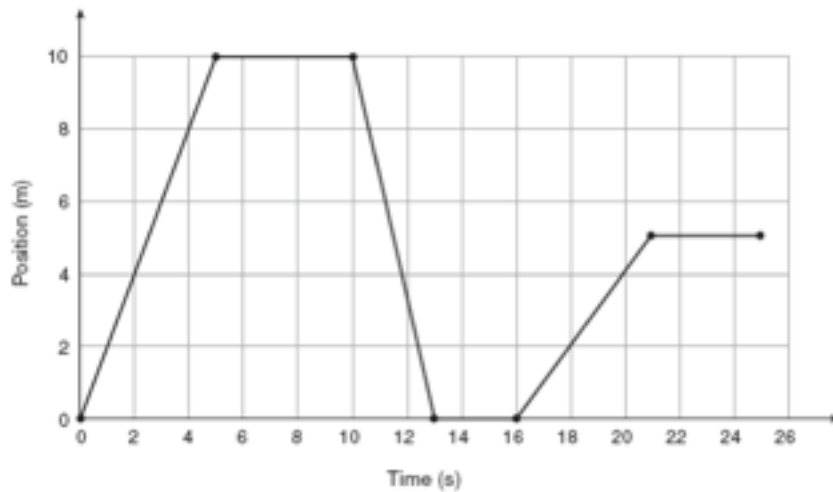
18. The graph shows the displacement of a skateboarder on a sidewalk. What is the average velocity of the skateboarder in the interval between 2 and 4 seconds?
A. 0.5 m/s B. 2 m/s C. 4 m/s D. 8 m/s

19. The Eurotunnel connects Great Britain and France, passing under the English Channel. A train leaves France with an average velocity of 110 km h and travels 37 km in the tunnel. How long is the train in the tunnel?
A. 20 min B. 68 min C. 244 min D. 4070 min

Plot the data given in the table onto the grid to answer the next question.

Position vs. Time

Time (s)	Position (m)
0	0
1	10
2	20
3	30
4	40
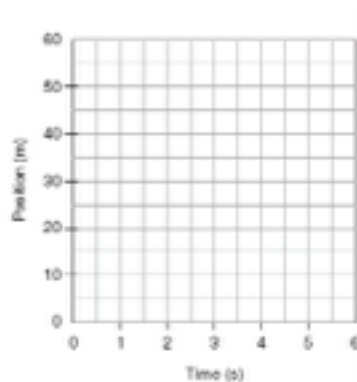
20. What is the displacement after 5 s if the object continues to travel uniformly?
A. 5 m B. 10 m C. 50 m D. 250 m

21. The rate of change of velocity is represented by which of the following?
A. s B. m C. m/s D. m/s^2

22. A ball accelerates at 9.8 m/s^2 in free fall. Which of the following correctly describes the motion of the ball as it is falling?

	Velocity	Acceleration
A	constant	constant
B	constant	decreasing
C	increasing	constant
D	increasing	increasing

Use the following velocity vs. time graph to answer the next question.
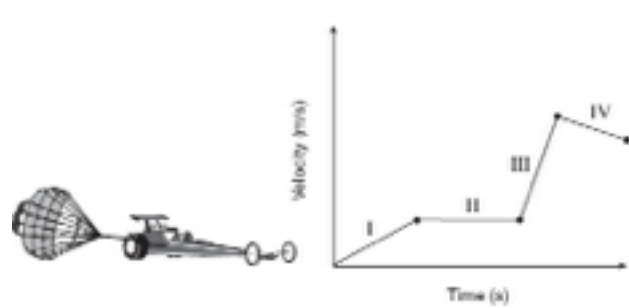
23. The graph above shows the motion of a dragster. During which interval does the dragster have the greatest acceleration?
    A. interval I   B. interval II   C. interval III   D. interval IV

24. A NASA space shuttle accelerates from rest to a velocity of 50 m s in 4 s. What calculation must be used to determine the shuttle's acceleration?

A	$a = 4 \text{ s} \times 50 \text{ m/s}$
B	$a = \dfrac{4 \text{ s}}{50 \text{ m/s}}$
C	$a = \dfrac{50 \text{ m/s}}{4 \text{ s}}$
D	$a = \left(\dfrac{50 \text{ m/s}}{4 \text{ s}}\right)^2$

Use the data given in the table and the grid provided to answer the next question.
The data represents the motion of a powerboat.
Use the grid provided to determine the acceleration of the boat.

Time (s)	Velocity of Boat (m/s)
0.0	1.9
1.0	4.1
2.0	6.0
3.0	8.2
4.0	9.9
5.0	12.2

25. What is the acceleration of the boat?
    A. 1 m/ s²   B. 2 m/ s²   C. 3 m/ s²   D. 4 m/ s²

26. In which of the following situations is the displacement the greatest?
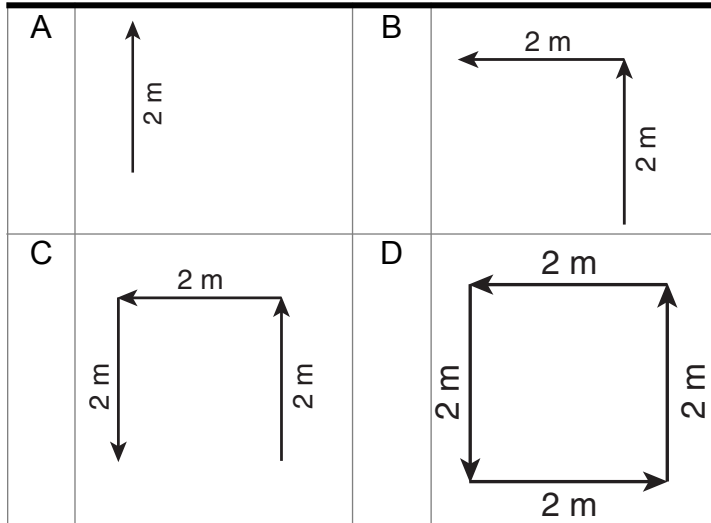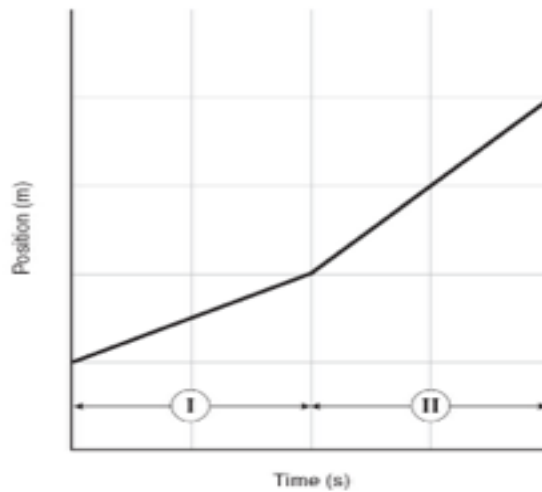

Use the following information to answer the next question.

| **distance** is to **displacement** |
| as |
| **speed** is to _____?_____ |

27. Which of the following terms completes the comparison?
A. time   B. velocity   C. acceleration   D. displacement

Use the following position – time graph to answer the next question.

28. Which of the following statements correctly compares the motion of the object during time intervals Ⓘ and Ⓘ on the graph?
A. During both intervals, the object travels the same distance.
B. During both intervals, the object is travelling the same velocity.
C. During interval Ⓘ, the object is travelling faster than in interval Ⓘ.
D. During interval Ⓘ, the object travels a greater distance than in interval Ⓘ.

**Use the following graphical representation of a swimmer to answer the next question.**
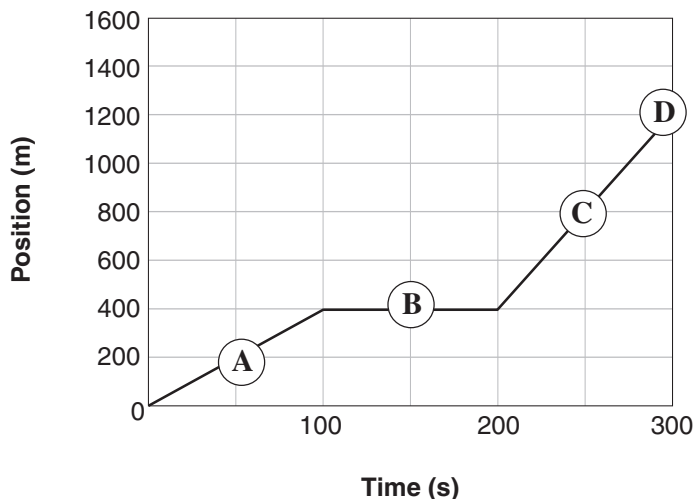

29.   Which part of the graph shows the swimmer resting for 100 s?
      A. A   B. B   C. C   D. D

30.   A family on vacation drove 200 km in two hours and then travelled only 40 km during the
      next hour due to a construction zone.
      What was the family's average velocity during the trip?
      A. 40 km/h   B. 70 km/h   C. 80 km/h   D. 120 km/h

31.   Which of the following units is associated with the Δd symbol in motion formulae?
      A. s   B. m   C. m/s   D. m/s²

32.   A mosquito flies at 4 m/s covering a distance of 5m. What calculation determines the time
      interval?

A	$t = \dfrac{5 \text{ m}}{4 \text{ m/s}}$
B	$t = \dfrac{4 \text{ m/s}}{5 \text{ m}}$
C	$t = 5 \text{ m} \times 4 \text{ m/s}$
D	$t = 5 \text{ m} - 4 \text{ m/s}$

33.   Light travelling at 300 000 km/s takes 8 minutes to travel from the sun to the earth.
      What is the distance from the sun to the earth?
      A. 37 000 km   B. 225 000 km   C. 2 400 000 km   D.144 000 000 km

Use the following position vs. time graph for an object travelling in a straight line to answer the next question.
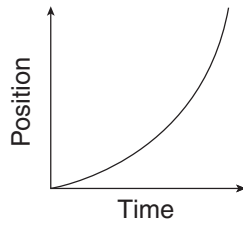

34. Which of the following is represented by the graph?
    A. uniform motion   B. zero acceleration
    C. constant velocity   D. increasing velocity

35. A car moving at +15 m/s pulls onto the highway and accelerates at +1.2 m/s² for 8.2 s. What is the final velocity?
    A. +9.8 m/s   B. +16.2 m/s   C. +20.7 m/s   D. +24.8 m/s

36. Which of the following graphs represents an object with a positive uniform acceleration?

A.

B.

C.

D.
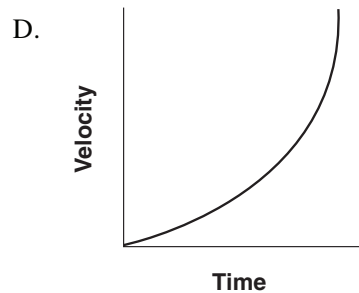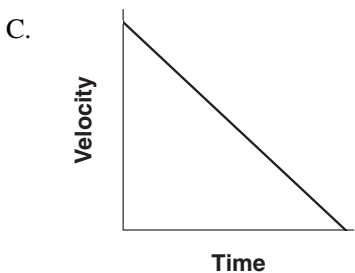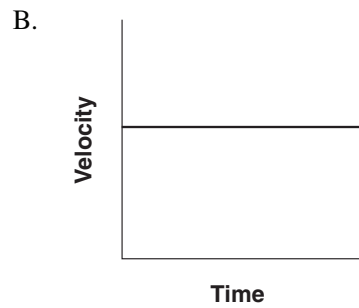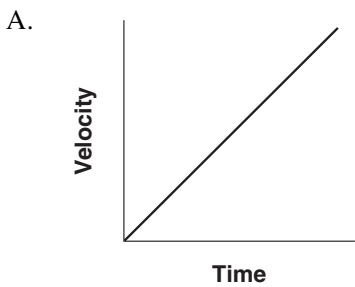
37. Which of the following describes a positive acceleration?
    A. a book resting on a desk top
    B. a car braking as it is approaching a stop sign
    C. a speed skater going from rest to 10 m/s in 5 s
    D. a skier sliding down a slope with constant velocity

38. At a safety-testing facility, a car travelling +30 m/s is brought to rest at 0.5 s. What is the acceleration of the car during this interval?
    A. -15 m/s²   B. +15 m/s²   C. -60 m/s²   D. +60 m/s
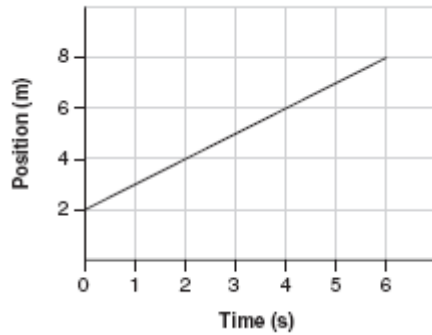
Use the following diagram of a falling ball to answer the following question.
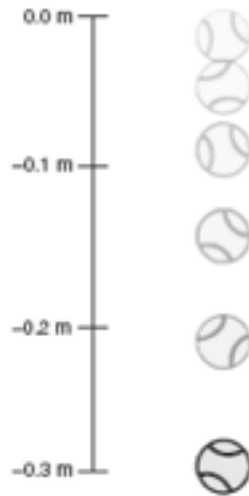
The diagram shows a single ball as it falls.

39. What is the displacement of the ball as it falls from 0.0 m to −0.3 m ?
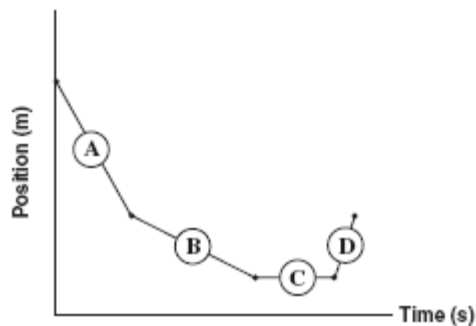   A. −0.3 m   B. −0.1 m   C. 0.1 m   D. 0.3 m

Use the following position vs. time graph to answer the next question.

| I	Position
II	Velocity
III	Displacement

40. Which of the following can be determined from the graph?
    A. I only   B. I and III only   C. II and III only   D. I, II and III

Use the following position–time graph for a moving car to answer the next question.

41. During which time interval does the car have the greatest negative velocity?
    A. **A**   B. **B**   C. **C**   D. **D**

Use the following graphic and position–time graph to answer the next 2 questions.
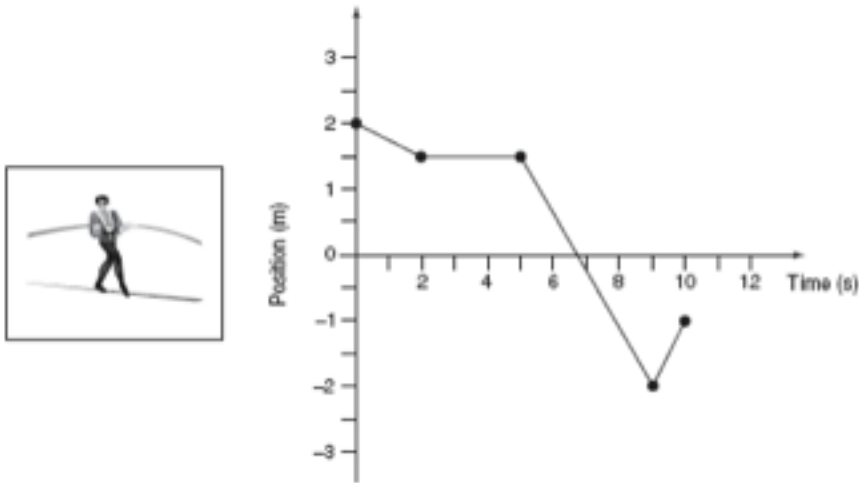
42. A tightrope walker starts 2 m from the centre of a rope. Which of the following describes the sequence of events that follow?

I	From 0 to 2 s, the walker moves in a negative direction.
II	From 2 to 5 s, the walker stands still.
III	From 5 to 9 s, the walker moves in a positive direction.

    A. I and II only   B. I and III only   C. II and III only   D. I, II and III

43. During which time interval is the tightrope walker moving with a positive velocity?
    A. 0–2 s   B. 2–5 s   C. 5–9 s   D. 9–10 s

44. In the 2008 Beijing Olympics, Usain Bolt set two world records. He ran the 100 m race in 9.69 s and the 200 m race in 19.30 s. What was his average velocity for each race?

	Average velocity: 100 m race	Average velocity: 200 m race
A	+0.0969 m s	+0.0965 m s
B	+10.32 m s	+10.36 m s
C	+10.35 m s	+10.35 m s
D	+10.41m s	+20.82 m s

45. A dragonfly travels 100 m north at 8 m/s, then 50 m north at 10 m/s . What is its average velocity?
    A. 8.3 m/s north   B. 8.6 m/s north   C. 16.7 m/s north   D. 25.0 m/s north

Unit 3 - Physics / Motion

1. D
2. A
3. B
4. B
5. D
6. C
7. B
8. A
9. B
10. D
11. C
12. A
13. D
14. D
15. B
16. C
17. D
18. B
19. A
20. C
21. D
22. C
23. C
24. C
25. B
26. B
27. B
28. D
29. B
30. C
31. B
32. A
33. D
34. D
35. D
36. A
37. C
38. C
39. A
40. D
41. A
42. A
43. D
44. B
45. B