حل تجميعة أسئلة صفحات الكتاب وفق الهيكل الوزاري الجديد منهج انسباير

تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ⇦ المناهج الإماراتية ⇦ الصف التاسع العام ⇦ علوم ⇦ الفصل الأول ⇦ ملفات متنوعة ⇦ الملف

تاريخ إضافة الملف على موقع المناهج: 16-11-2025 15:57:03

المزيد من مادة علوم:	ملفات ا كتب للمعلم ا كتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي ا للمدرس

التواصل الاجتماعي بحسب الصف التاسع العام

صفحة المناهج الإماراتية على فيسبوك					
المواد على تلغرام	التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات	

المزيد من الملفات بحسب الصف التاسع العام والمادة علوم في الفصل الأول

1	تجميعة أسئلة اختبارات سابقة وفق الهيكل الوزاري الجديد منهج بريدج
2	مراجعة عامة وفق الهيكل الوزاري الجديد منهج بريدج
3	مراجعة نهائية شاملة وفق الهيكل الوزاري الجديد منهج انسباير
4	نموذج اختبار نهائي وفق الهيكل الوزاري منهج بريدج
5	تجميعة أسئلة مراجعة وفق الهيكل الوزاري الجديد منهج انسباير

Term 1

EOT Revision

Grade 9 GEN Science

2025-26

Grade 9 General Term 1 Revision Booklet
2025- 2026

1-Differentiate between scientific theory and scientific law
Explain why a scientific theory cannot become a scientific law

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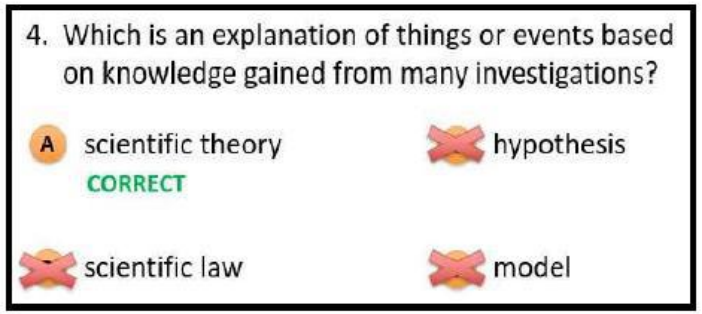
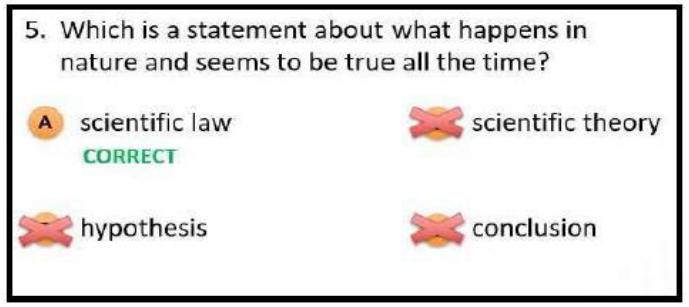
Scientific theories	Scientific laws
an explanation of things or events based on knowledge gained from many observations and investigations.	a statement about what happens in nature and seems to be true all the time.

Which is a statement about what happens in nature and seems to be true all the time?
a. scientific theory
b. scientific law
c. scientific hypothesis
d. scientific model



Newton provided an explanation for why objects fall; he proposed that objects fall because they and Earth are attracted by a force. Which of the following represents what Newton said?
A scientific model
A scientific hypothesis
A scientific theory
A scientific law



1-A has been tested and supported many times.
a. scientific theory
b. scientific law
c. scientific hypothesis
d. scientific model

Explain why a scientific theory cannot become a scientific law
Because laws describe what happens, while theories explain why it happens.

2-Express the derived units for common quantities (like velocity, acceleration, force, pressure, volume, density) in terms of their SI base units

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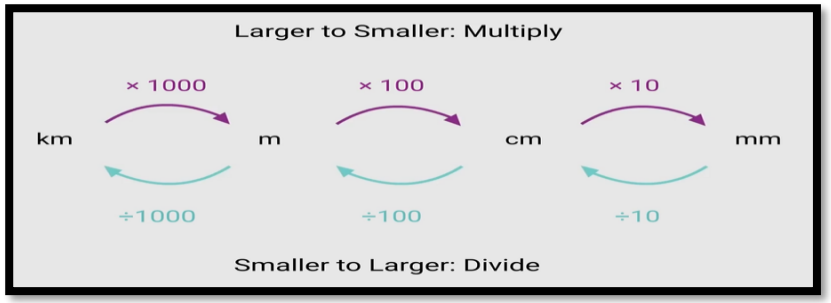
SI Base Units

Quantity Measured	Unit	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Temperature	kelvin	K
Amount of substance	mole	mol
Intensity of light	candela	cd

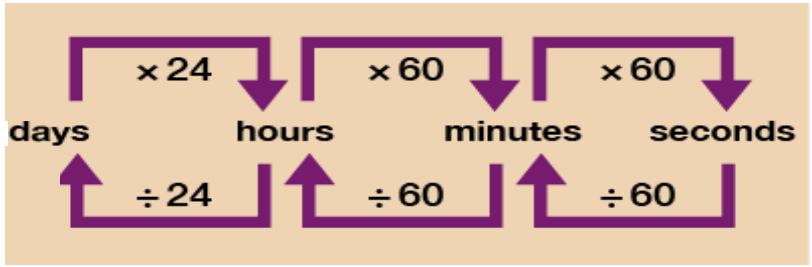
Derived quantity

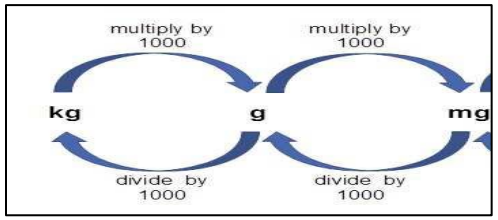
Derived Quantity	Units
Volume, V	m^3
Density, ρ	kgm^{-3}
Velocity, v	m/s
Force, F	N
Acceleration, a	m/s^2

What is the SI base unit of temperature?
a. Celsius
b. Fahrenheit
c. Kelvin
d. Joule



What is the base unit of time?
a. Second
b. Minute
c. Hour
d. Day





Use dimensional analysis to validate equations and to choose the appropriate conversion factor when converting units

Demonstrate how to use dimensional analysis by using it to convert 35 km/h to m/s.

$$\left(\frac{35\ \text{km}}{\text{h}}\right)\left(\frac{1000\ \text{m}}{1\ \text{km}}\right)\left(\frac{1\ \text{h}}{60\ \text{min}}\right)\left(\frac{1\ \text{min}}{60\ \text{s}}\right) = 9.7\ \text{m/s}$$

6. Convert 5021 centimeters to kilometers.

$$5021\ \text{cm}\left(\frac{1\ \text{m}}{100\ \text{cm}}\right)\left(\frac{1\ \text{km}}{1000\ \text{m}}\right) =$$

$$5.021\times10^{-2}\ \text{km}$$

7. How many seconds are in a leap year?

$$366\ \text{days}\left(\frac{24\ \text{hr}}{1\ \text{day}}\right)\left(\frac{60\ \text{min}}{1\ \text{hr}}\right)\left(\frac{60\ \text{s}}{1\ \text{min}}\right) =$$

$$31{,}622{,}400\ \text{s}$$

8. Convert the speed 5.30 m/s to km/h.

$$\left(\frac{5.30\ \text{m}}{1\ \text{s}}\right)\left(\frac{60\ \text{s}}{1\ \text{min}}\right)\left(\frac{60\ \text{min}}{1\ \text{h}}\right)\left(\frac{1\ \text{km}}{1000\ \text{m}}\right) =$$

$$19.08\ \text{km/h}$$

3-Use dimensional analysis to validate equations and to choose the appropriate conversion factor when converting units

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EXAMPLE Problem 1

USING DISTANCE AND TIME TO FIND SPEED When a car travels 434 km in 4.5 h, what is the car's average speed?

1 ANALYZE AND SKETCH THE PROBLEM

The car's speed is unknown. The known values include the distance the car traveled and the time. Use the relationship among speed, distance, and time to solve for the car's speed.

Known	Unknown
distance = 434 km	speed = ?
time = 4.5 h	

2 SOLVE FOR THE UNKNOWN

distance = **speed** × time — State the relationship as an equation.

$$\textbf{speed} = \frac{\text{distance}}{\text{time}}$$ — Solve the equation for speed.

$$\textbf{speed} = \frac{434\ \text{km}}{4.5\ \text{h}}$$ — Substitute distance = 434 km and time = 4.5 h.

speed = 96.4 km/h — Calculate, and specify the units.

3 EVALUATE THE ANSWER

Check your answer by using it to calculate the distance the car traveled.

distance = speed × time = 96.4 km/~~h~~ × 4.5 ~~h~~ = 434 km

The calculated distance matches the distance stated in the problem. This means that the calculated average speed is correct.

A radar detected a car moving in speed of **125 Km/hr**, what is the speed of the car in meters per second.

رصد رادار سيارة تتحرك بسرعة (125 Km/hr) ما هي سرعة السيارة بوحدة المتر في الثانية؟

Learning Outcomes Covered

- PHY.6.1.01.002

a. 34.7 m/s

b. 125×10^3 m/s ✓

c. 2083 m/s

d. 2.08 m/s

4- Identify the significant digits in a given number
-Use appropriate significant figures to record answers from a mathematical operation, with the correct number of digits

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Rules for Counting Significant Digits:

- All non-zero digits and any zeros contained between non-zero digits count.
  300042 = 6 significant digits
- Leading zeros don't count.
  0.000034 = 2 significant digits
- Trailing zeros count if there is a decimal point.
  0.0002500 = 4 significant digits
- Trailing zeros may or may not count if there is no decimal point, so we go with the most conservative answer.
  190000 = 2 significant digits (could be up to 6)

8. Significant Figures Solve the following problems, using the correct number of significant figures each time.
a. 10.8 g 8.264 g
b. 4.75 m --0.4168 m
c. 139 cm x 2.3 cm
d. 13.78 g/11.3 mL
e. 1.6 km + 1.62 m + 1200 cm

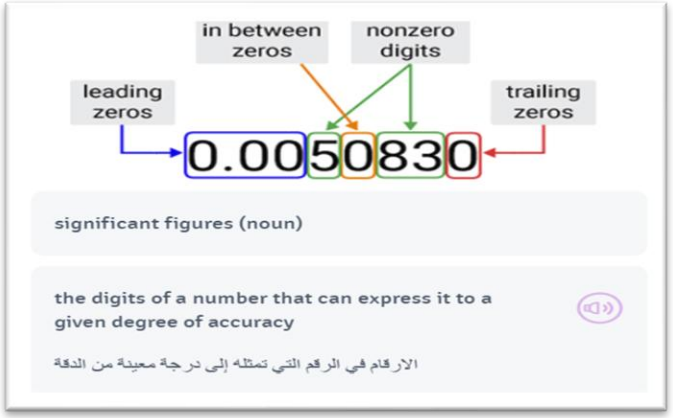
a. 10.8 g - 8.264 g
10.8 g - 8.264 g = 2.536 g
= 2.5 g after rounding

b. 4.75 m 0.4168 m
4.75 m - 0.4168 m = 4.3332 m
4.33 m after rounding

C- 139 cm x 2.3 cm =
320 cm^2 or 3.2 x 102 cm^2

13.78 g + 11.3 mL
1.22 g/mL

1.6 km + 1.62 m + 1200 cm = 1613.62 m
= 1600 m or 1.6 km after rounding



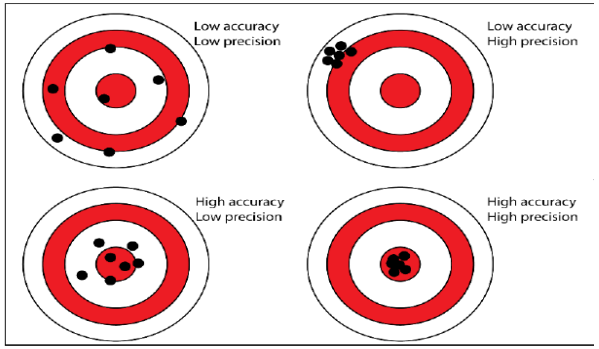
What is the number of significant digits in the measurement 10.005m?
a. 2
b. 3
c. 4
d. 5

What is the answer to (56 + 2.15 + 0.5643), giving the correct number of significant figures in the answer?
59
58
58.7143
58.71

What is the number of significant digits in the measurement 2.002m?
a. 2
b. 3
c. 4
d. 5

5-Compare and contrast precision and accuracy with examples

1. Not sure about something — **Uncertainty**
2. How closed a measured value is to an accepted value — **Accuracy**
3. How close a series of measurements are one to another — **Precision**



Which is more accurate when measuring a book that has a true length of 17.0 cm?

Susan:

17.0 cm, 17.01 cm, 16.9 cm

Amy:

17.5 cm, 15.0 cm, 15.2 cm

describes how closely measurements are to each other,

Which set is more precise?

a) 17.2 , 18.4 , 18.35

b) 15.9 , 15.89 , 15.91

c) 16.8 , 17.2 , 19.44

Example above, student 3's measurements are the most precise, within ± 0.1 cm.

Both the measurements of student 1 and student 2 are less precise because they have a larger uncertainty (student 1 = ± 0.2 cm, student 2 = ± 0.3 cm).

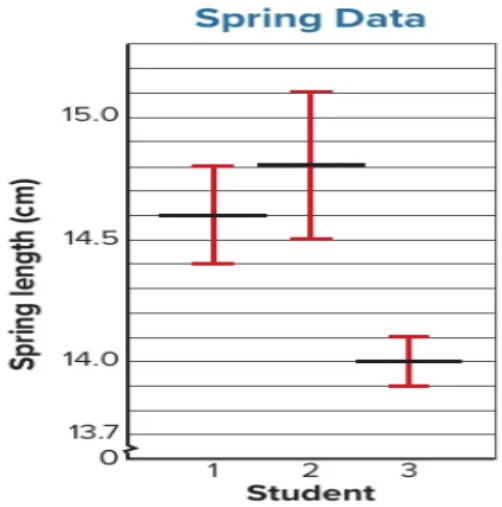


Figure 10 Three students took multiple measurements. The red bars show the uncertainty of each student's measurement.

5-Compare and contrast precision and accuracy with examples

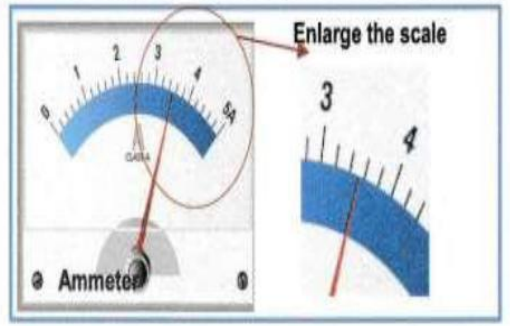
The three arrows represent three measurements for an experiment.
Depending on the picture, which of the following statements is correct regarding to precision and accuracy?

a. Measurements are accurate but not precise
b. Measurements are precise but not accurate
c. Measurements are neither accurate nor precise
d. Measurements are accurate and precise

Q8

· Depending on the figure, what is the measure shown on the meter ? include the uncertainty

- ☐ $(3.6 \mp 0.2)\ A$
- ☐ $(3.4 \mp 0.2)\ A$
- ☐ $(3.6 \mp 0.1)\ A$
- ☐ $(3.4 \mp 0.1)\ A$



Q7

❖ According to the table next to the measurement of the mass of a wooden box by four students each with three attempts to measure, if you know that the real mass of the box is (2.5 kg) answer items (6 and 7).

Student	1st attempt	2nd attempt	3rd attempt
Mahmoud	2.3 kg	2.5 kg	2.7 kg
Hamdan	2.2 kg	2.6 kg	2.9 kg
Adam	2.8 kg	2.9 kg	2.8 kg
Sultan	2.6 kg	3.3 kg	2.9 kg

· Which student has the most precise measurements?
a. Mahmoud
b. Hamdan
c. Adam
d. Sultan

· Which student has the most accurate measurements?
a. Mahmoud
b. Hamdan
c. Adam
d. Sultan

How close are a set of measurements to each other when taken the same way?
Precision
Accuracy
Measurement

1.01, 1.03, 1.02	It is accurate and precise.
0.9, 1.1, 1.0	It is accurate, but not precise.
0.788, 0.779, 0.755	It is precise, but not accurate.
1.3, 1.5, 0.8	It is neither accurate nor precise.

6- Define and identify independent and dependent variables for a given data

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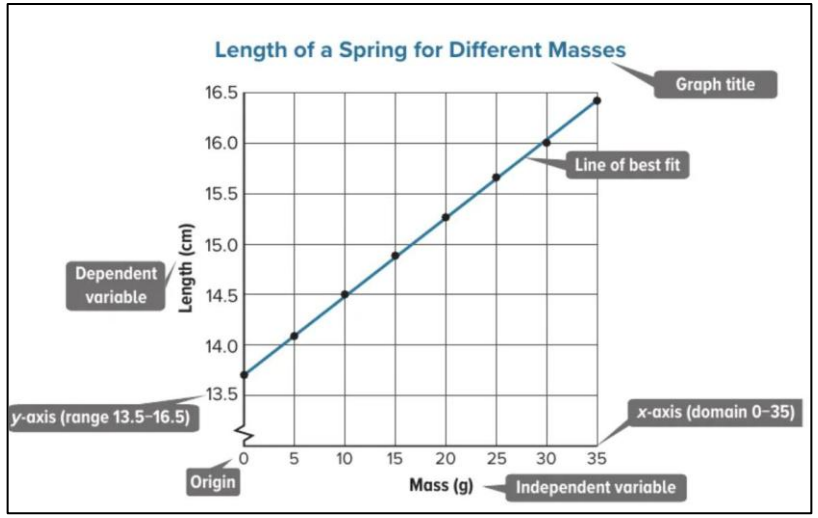
7-Represent data in graphical form, draw the best fit line, and identify from the shape of the graph if the relationship between the variables is linear

- Independent Variable: What the scientist changes.
- Dependent Variable: What is measured.
- Constants: Factors kept the same.
- Control Group: The standard for comparison.

Table 3 Length of a Spring for Different Masses

Mass Attached to Spring (g)	Length of Spring (cm)
0	13.7
5	14.1
10	14.5
15	14.9
20	15.3
25	15.7
30	16.0
35	16.4



NOTE : Independent variable is plotting on x axis

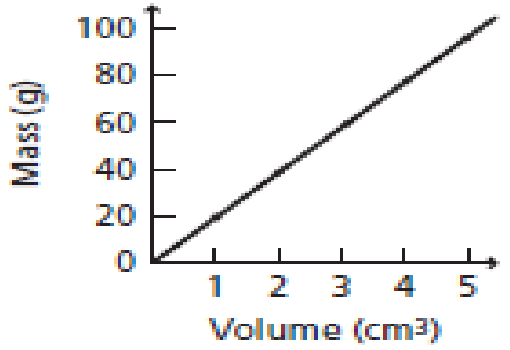
dependent variable is plotting on x axis

The mass values of specified volumes of pure gold nuggets are given in **Table 1-4.**

Table 1–4
Mass of Pure Gold Nuggets

Volume (cm^3)	Mass (g)
1.0	19.4
2.0	38.6
3.0	58.1
4.0	77.4
5.0	96.5

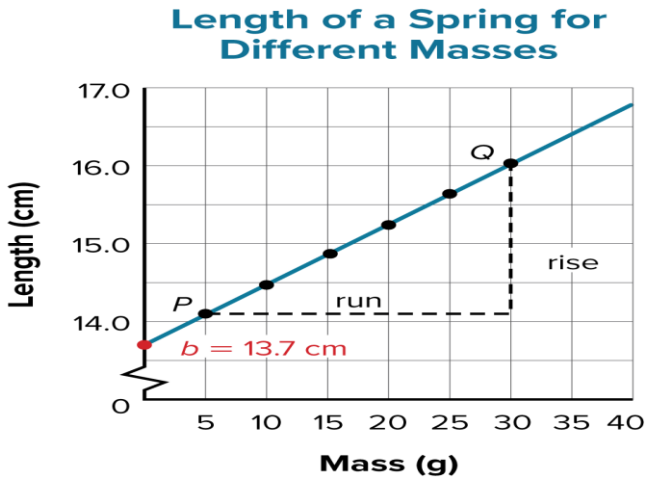
a. Plot mass versus volume from the values given in the table and draw the curve that best fits all points.



8-Identify the mathematical equation for linear relations

A linear relationship can be written as an equation:

$$\frac{16\ cm - 14.1\ cm}{30\ g - 5\ g} = 0.08\ cm/g$$



ESE QUESTIONS

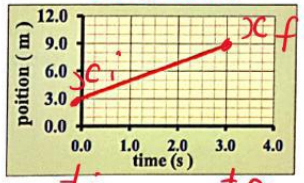
$x_f = 9\ m,\ x_i = 3\ m$

$t_f = 3\ s$

$t_i = 0$

6- Depending on the (position - time) graph for an object, what is its average velocity?

- ☑ $+2.0\ m/s$
- ☐ $-2.0\ m/s$
- ☐ $+3.0\ m/s$
- ☐ $-3.0\ m/s$



$$\bar{V} = \frac{x_f - x_i}{t_f - t_i} = \frac{9-3}{3} = \frac{6}{3} = +2.0\ m/s$$

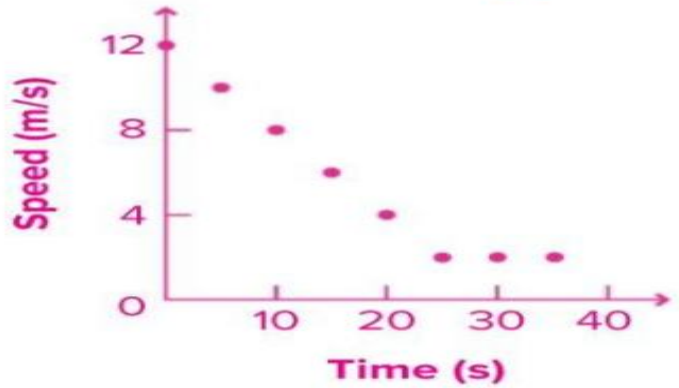
9- Predict the unknown values in a linear relation using the slope and the intercept with the vertical axis

Check Your Progress

19. **Make a Graph** Graph the following data. Time is the independent variable.

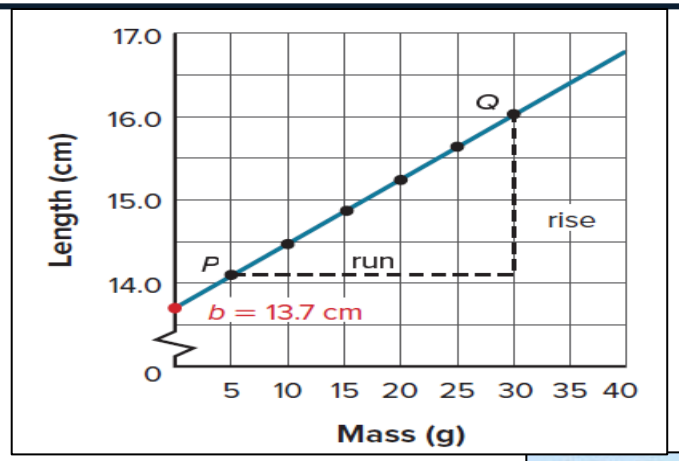
Time (s)	0	5	10	15	20	25	30	35
Speed (m/s)	12	10	8	6	4	2	2	2

19.



20. **Interpret a Graph** What would be the meaning of a nonzero *y*-intercept in a graph of total mass versus volume?

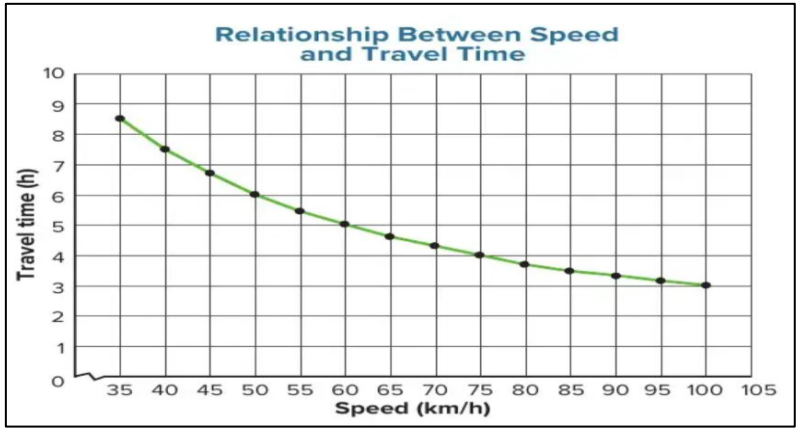
20. There is a nonzero total mass when the volume of the material is zero. This could happen if the mass value



21. **Predict** Use the relationship illustrated in **Figure 16** to determine the mass required to stretch the spring 15 cm.

21. 17 g

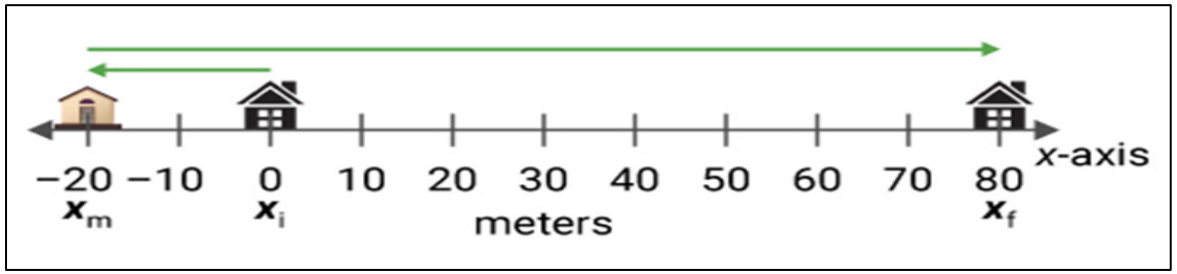
22. **Predict** Use the relationship shown in **Figure 18** to predict the travel time when speed is 110 km/h.



22. About 2.6 h

10-Differentiate between distance travelled and displacement

Distance The length of a path traveled between two positions (SI unit m)



(Displacement) $\Delta x = x_f - x_i$

$x_i = 0m$ $x_f = 80\,m$

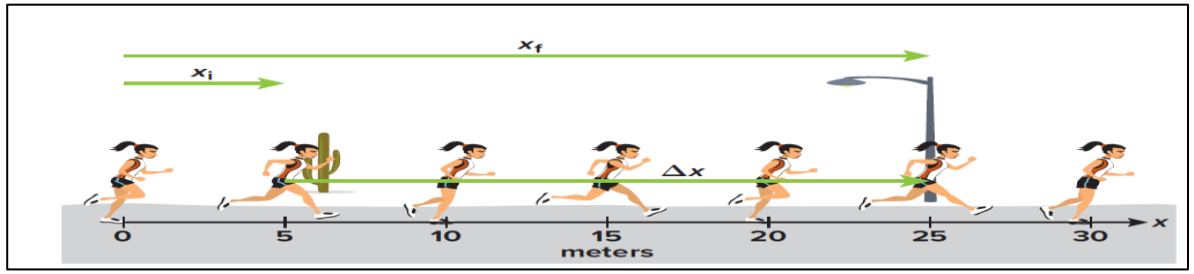
$\Delta x = 80 - 0 = 80m$ *East*

Distance = 20 + 20 + 80 = 120 m

Displacement

Is a change in position.

Is the distance with a given direction between starting point (x_i) and ending point (x_f)



(Displacement) $\Delta x = x_f - x_i$

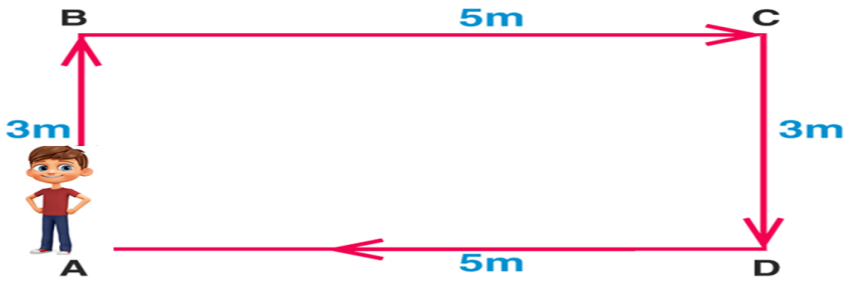
$x_i = 5m$ $x_f = 25m$

$\Delta x = 25 - 5 = 20m$ *East*

Distance = 25m

Adam has started moving from point A, he passed the points B, C, D as shown in the figure before he came back to point A. What is Adam's total displacement?

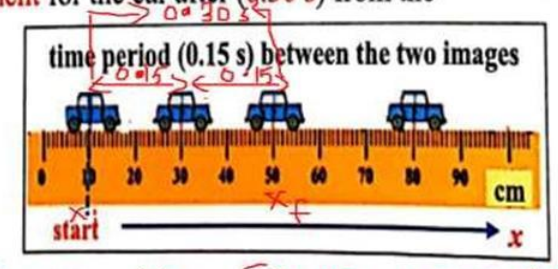
بدأ آدم الحركة من النقطة A مرورا بالنقاط B, C, D كما هو موضح بالشكل قبل ان يعود مجددا للنقطة A. ما ازاحة آدم الكلية؟



ESE QUESTIONS

i- Depending on the figure, what is the displacement for the car after (0.30 s) from the beginning of its movement?

- ☐ +70 cm
- ☐ +50 cm
- ☐ +80 cm
- ☑ +40 cm

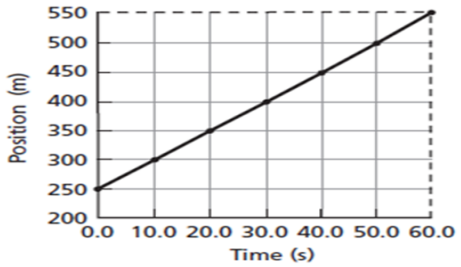


$x_f = 50cm$ $x_i = 10cm$ $\Delta x = x_f - x_i = 50cm - 10cm = +40cm$

10-Differentiate between distance travelled and displacement

The position-time graph below shows the cyclist's location in a 60s-time interval. What is the cyclist's displacement from the starting position at 40.0 s?

يوضح الرسم البياني الموقع-الزمن أدناه موقع راكب دراجة في فاصل زمني 60s. ما إزاحة راكب الدراجة عن نقطة البداية في الثانية 40.0؟



(Displacement) $\Delta x = x_f - x_i$

$x_i = 250m$ $x_f = 450\,m$

$\Delta x = 450 - 250 = 200m\ East$

Classify physical quantities into vector and scalar quantities (distance, mass, displacement, speed, velocity, acceleration, force, work, energy, pressure

Vector- has a magnitude (value) and direction	Scalar - has only magnitude (value)
displacement	distance
velocity	mass
acceleration	Speed
Force	work
	energy
	pressure
	Time
	Temperature

If the Emirati Hope Probe orbited Mars one full cycle, what is the probe's distance traveled and displacement?

a. Distance is circumference of the circular orbit while displacement is zero.
المسافة ⌀ محيط المدار الدائري بينما الإزاحة تساوي صفر ✓

b. Distance and displacement both are zero
المسافة والإزاحة كلاهما صفر

c. Distance is zero while the displacement is circumference of the circular orbit.
المسافة صفر بينما الإزاحة ⌀ محيط المدار الدائري

d. Distance and displacement both are equal to circumference of the circular orbit.
المسافة والإزاحة كلاهما يساوي محيط المدار الدائري

Ahmed moved 40m west from his starting point and then turned back and moved 100m due east in a straight-line path . Find his displacement.

a. 60 m east

b. 60 m west

c. 140 m east

d. 140 m west

$(100\,m)_E - (40\,m)_W = 60m\ E$

10-Differentiate between distance travelled and displacement

7- Depending on the (position - time) graph for an object moving to the west.
What is the position of the object after (30 s) if it continues its motion with the same average velocity?

- ☐ −240 m
- ☑ −160 m
- ☐ −110 m
- ☐ −80 m

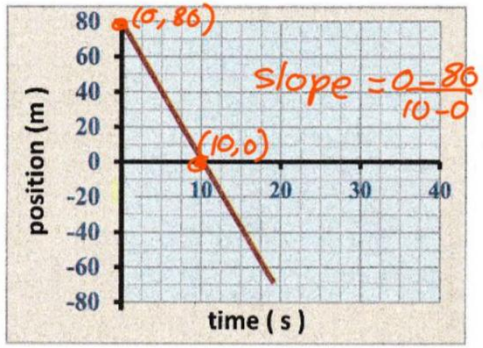
$y = mx + b$

$x = -8t + 80$

$x = -8(30) + 80$

$x = -240 + 80$

$x = -160\ m$

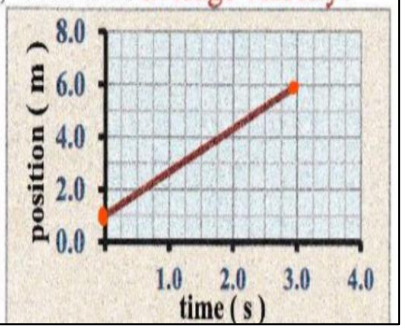


6- Depending on the (position - time) graph for an object, what is its average velocity?

- ☐ +2.0 m/s
- ☐ −2.0 m/s
- ☑ +1.7 m/s
- ☐ −1.7 m/s

$v = \frac{\Delta x}{\Delta t}$

$v = \frac{6-1}{3-0} = \frac{5}{3} \simeq 1.7$



– The following table shows Maryam's positions and times when she moved to the north inside her school on a straight line.

Time(s)	0	20	40	60	80	100	120	140
Position (m)	0	10	20	30	40	50	60	70

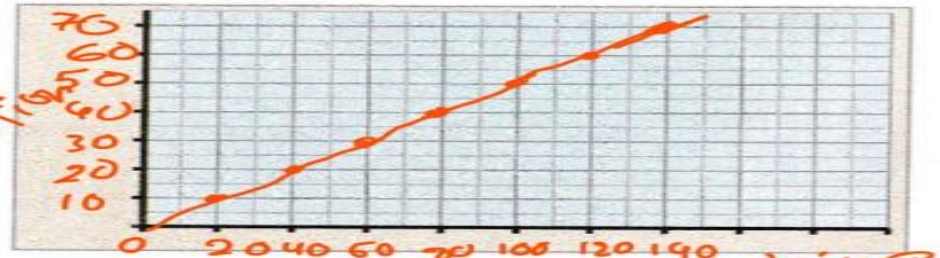
Answer (19 ,20 , 21)

x_f ← back ← x_i

19–Draw a position-time graph to represent Maryam's motion in the school.

20–Calculate the average velocity of Maryam using the position-time graph.

$v = \frac{\Delta x}{\Delta t}$



21-Calculate the average velocity of Maryam in (m/s) if she reaches back in (2.0) minutes.

$x_i = 70$, $x_f = 0$, $t = 2\ min = 2 \times 60\ s$

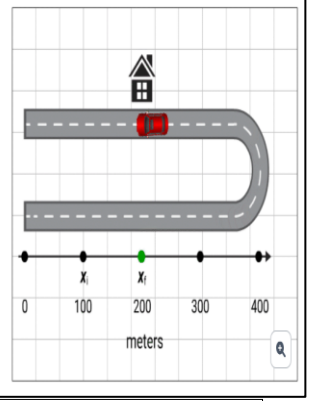
$v = \frac{\Delta x}{\Delta t} = \frac{0-70}{120} = -0.58\ m/s$

11- Classify physical quantities into vector and scalar quantities (distance, mass, displacement, speed, velocity, acceleration, force, work, energy, pressure

What is the horizontal displacement covered by the car?

Choose the correct option from the drop-down list.

The horizontal displacement the car covers is Select... .



(Displacement) $\Delta x = x_f - x_i$

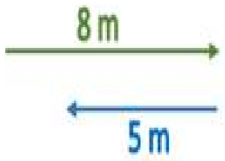
$x_i = 100m$ $x_f = 200\,m$

$\Delta x = 200 - 100 = 100m$ *East*

Distance = 400 + 200 = 600 m

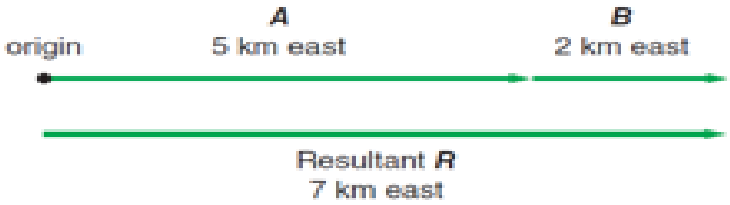
In the figure there are two vectors. The first vector magnitude is (8 m) directed east, and the second vector magnitude is (5 m) directed west.

What is the sum of the two vectors?



	Magnitude	Direction
a	13 m	East
b	3m	East
c	3m	West

Example of Vector Addition

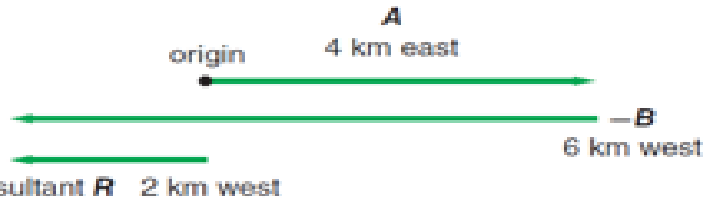


Example of Vector Addition

$R = A + B$
$= 5\text{ km} + 2\text{ km}$
$= 7\text{ km}$

$R = A + B$
$= 7\text{ km east}$

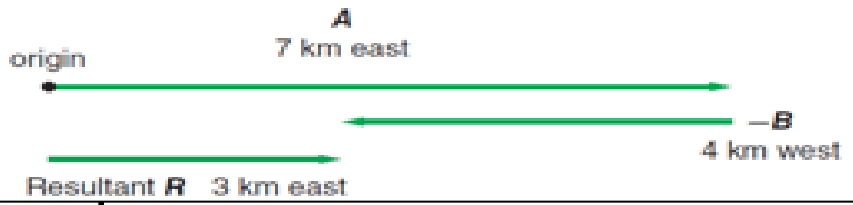
Examples of Vector Subtraction



Examples of Vector Subtraction

$R = A - B$
$= 4\text{ km} - 6\text{ km}$
$= -2\text{ km}$

$R = A - B$
$= A + (-B)$
$= 2\text{ km west}$



$R = A - B$
$= 7\text{ km} - 4\text{ km}$
$= 3\text{ km}$

$R = A - B$
$= A + (-B)$
$= 3\text{ km east}$

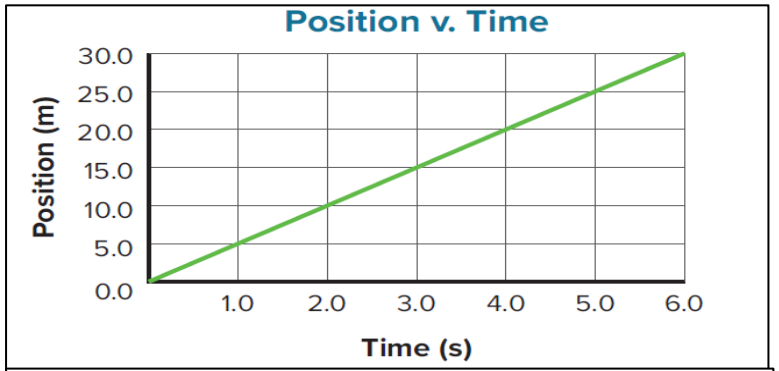
12- Plot a position-time graph given position-time value.

Page No. 37-38-39-40

Table 1 Position v. Time

Time (s)	Position (m)
0.0	0.0
1.0	5.0
2.0	10.0
3.0	15.0
4.0	20.0
5.0	25.0

1- Plot the data
2- Use the graph to draw a motion diagram
3-What is the instantaneous position at 3.0 second (15m)



Motion Diagram

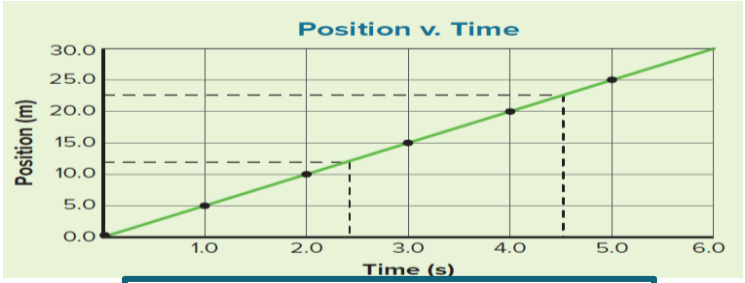
Begin • • • • • • • End

x 0 5 10 15 20 25 30 m
t 0 6 s

13- Convert a particle model to a position time graph and vice-versa

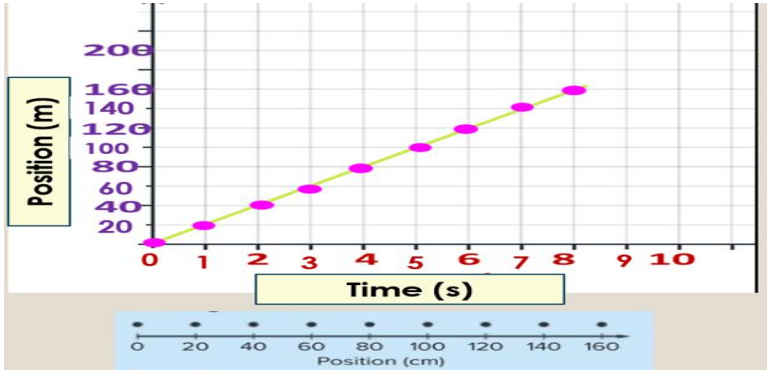
Page No. 41

EXAMPLE Problem 1
ANALYZE A POSITION-TIME GRAPH When did the runner whose motion is described in Figure 11 reach 12.0 m beyond the starting point? Where was she after 4.5 s?

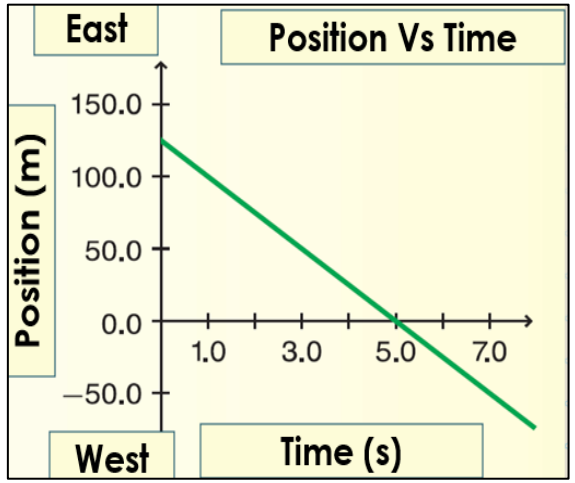


1- 2.4 s 2- 22.5 m

1-Using the particle model motion diagram of a baby crawling across a kitchen floor, plot a position-time graph to represent the motion. The time interval between dots on the diagram is 1 s.
1-Create a particle model motion diagram from the position-time graph



10-Describe the motion of each object in the following graph:



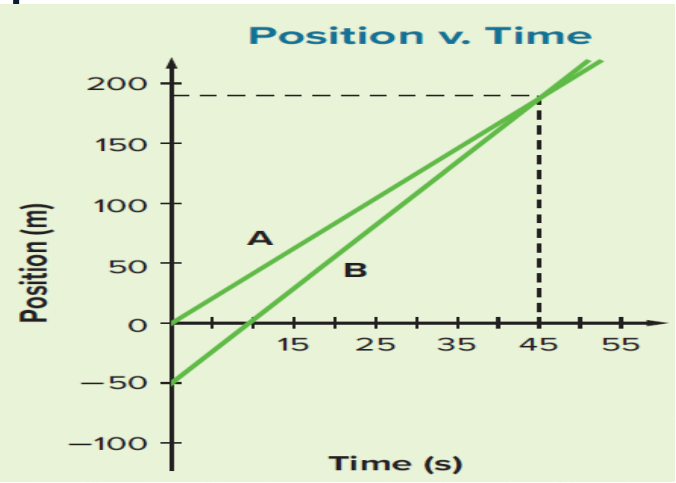
The car starts at a position 125.0 m and moves toward the origin, reaching the origin in 5.0 s after it started moving beyond the origin.

14- Interpret a position-time graph that represents the motion of multiple objects

Page No. 40

EXAMPLE Problem 2

INTERPRETING A GRAPH The graph to the right describes the motion of two runners moving along a straight path. The lines representing their motion are labeled A and B. When and where does runner B pass runner A?



1- At 45 s 2- 190 m

15- Apply the equation of motion, (xf = vavg t + xi) or (xf - xi = vavg t), in numerical problems to calculate the position or other physical quantities

Page No. 46-47

EXAMPLE Problem 4

POSITION The figure shows a motorcyclist traveling east along a straight road. After passing point ***B***, the cyclist continues to travel at an average velocity of 12 m/s east and arrives at point ***C*** 3.0 s later. What is the position of point ***C***?

$$x_f = \bar{v}\,t + x_i$$

$$x_f = (12 \times 3) + 46$$

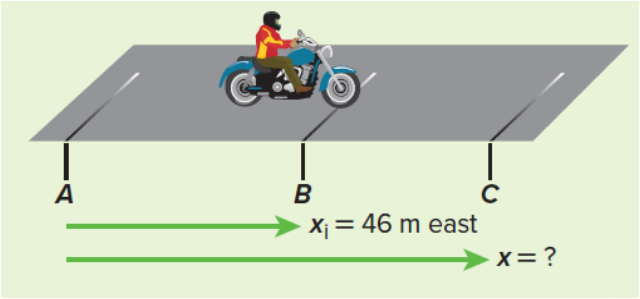
$$x_f = 82\ m \quad \text{East}$$

$\bar{v} = 12\ m/s \text{ east}$

$x_i = 46\ m$ east

$t = 3\ s$

$x_f = ?$



ESE QUESTIONS

Q9 A snail is moving along a straight path. Find the snail's position relative to its starting point if it moves 10.3 cm/s north for 3.10 s?

a 32 m b 0.32 m c 3.32 m d 3.32 cm

10.3 cm = 0.103 m

$x_f = (0.103 \times 3.10)$

$= 0.319\ m$

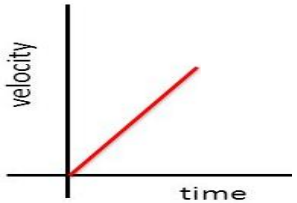
$= 0.32\ m$

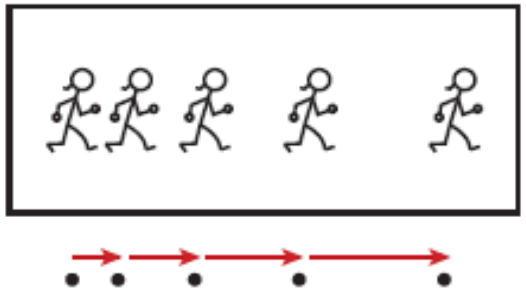
$x_f = V \times t$

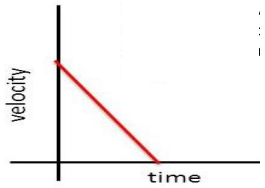
16-Recognize uniform or non-uniform motion from a motion diagram or a particle model.

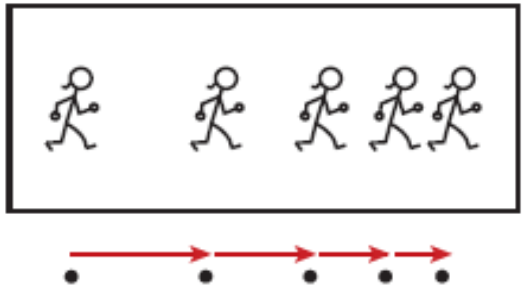
Page No. 53-58

Nonuniform motion
Change Velocity

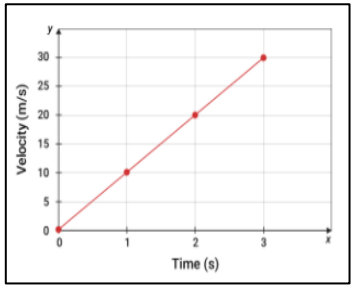


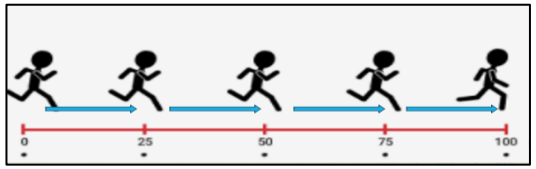




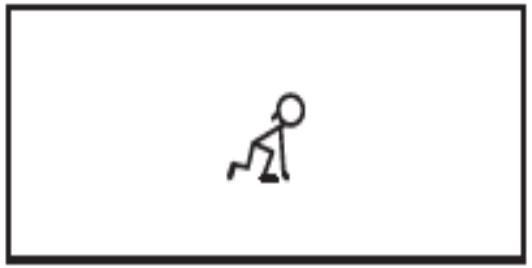


Uniform Motion
Velocity is Constant

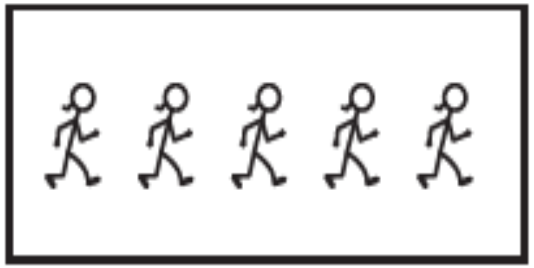




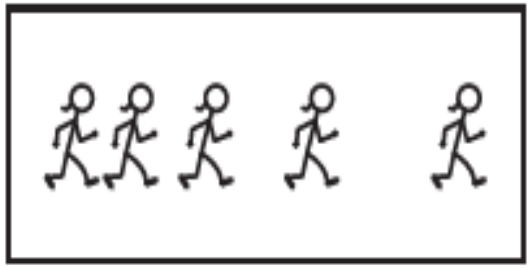
Motion Diagram



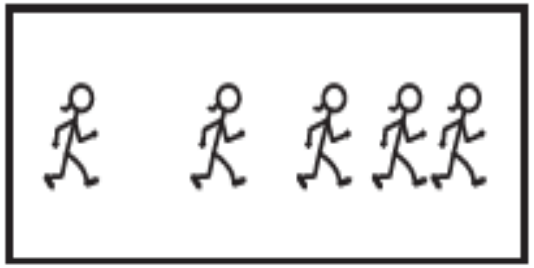
At Rest



Constant Speed



Speeding up



Slowing down

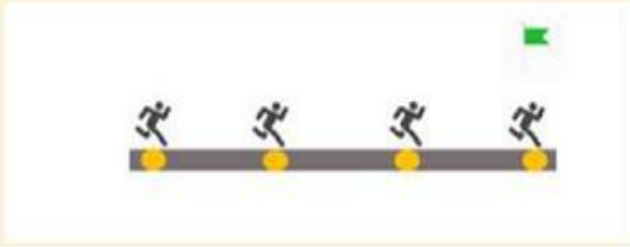
ESE QUESTIONS

16-Recognize uniform or non-uniform motion from a motion diagram or a particle model.

Page No. 53-58

Q3. What can you tell about the speed of the runner?

a. Speeding up
b. Slowing down
c. Moving with constant speed
d. Not moving



Q4.What can you tell about the speed of the runner?

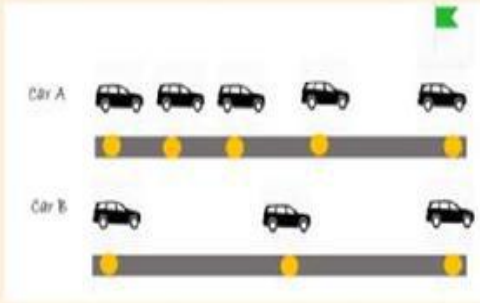
a. Speeding up
b. Slowing down
c. Moving with constant speed
d. Not moving

3. Which must be true about images used in a motion diagram?

- They are taken from different directions.
- They show different objects.
- B They are taken at equal intervals of time. CORRECT
- They show the same position.

Q5.Which car reached the destination first?

a. Car A
b. Car B
c. Both reached at same time



1. What is the diagram below called?

- a motion diagram
- a dot diagram
- C a particle model CORRECT
- a motion model

4. What would the particle model of a parked car look like?

- several dots equally spaced apart
- dots that get closer together
- dots that get farther apart
- D a single dot CORRECT

ESE QUESTIONS

16- Recognize uniform or non-uniform motion from a motion diagram or a particle model.

Page No. 53-58

Depending on the particle model in the figure for the motion of a vehicle, which of the following is true for the vehicle's motion?

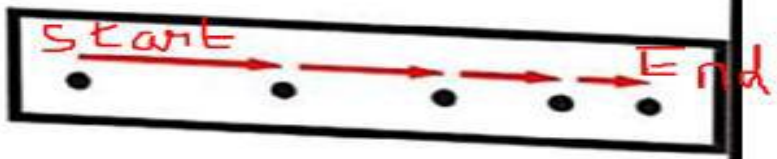
The vehicle moved at constant velocity
The vehicle moved faster
The vehicle moved slower
The vehicle started to move faster and then slower

Which of the following **particle model motion diagrams** represent the motion of flying bird in the figure?

a.
b.
c.
d.

(Constant speed)

❖ The next figure to a **toy car movement**, according to the figure, answer items (8 and 9).



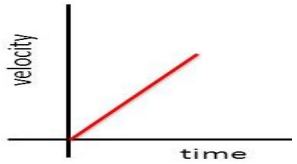
8- What is this **figure called**?

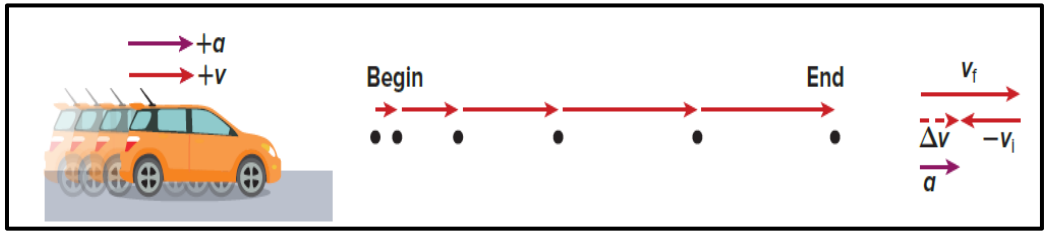
a. All images
b. Magnifying form
c. Sequential images
d. Particle model

9- Which is the correct description of the **car movement**?

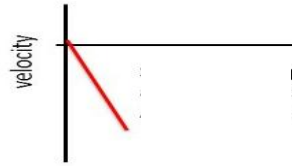
a. It does not move
b. Its speed decreases
c. Its speed is constant
d. Its speed increases

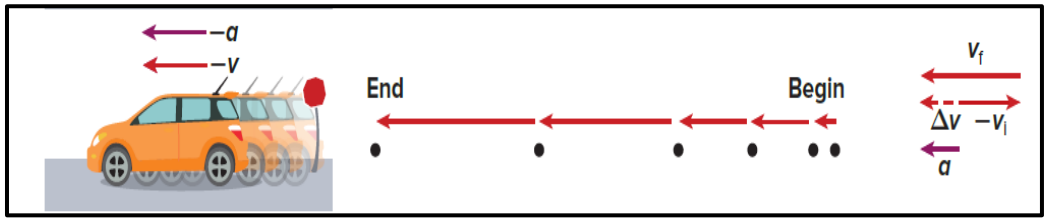
17- Describe the motion of an object if its velocity and acceleration are either in the same direction or opposite directions, hence state if an object is slowing down or speeding up



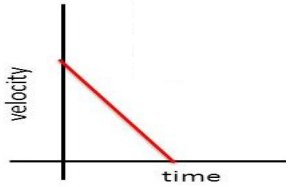


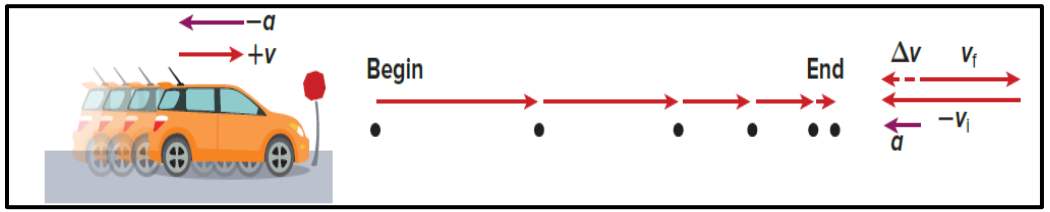
Speeding up - velocity and acceleration in the same direction (+v) (+a)



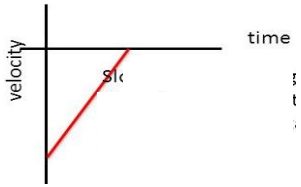


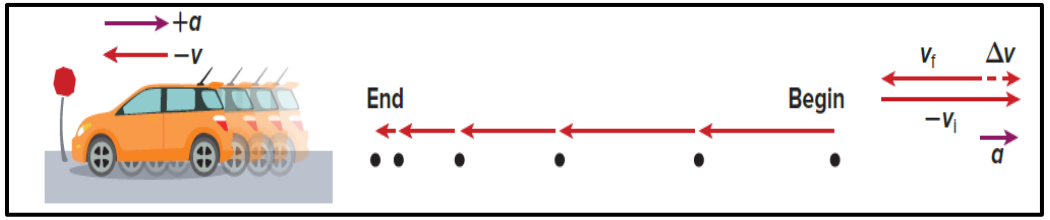
Speeding up - velocity and acceleration in the same direction (-v) (-a)



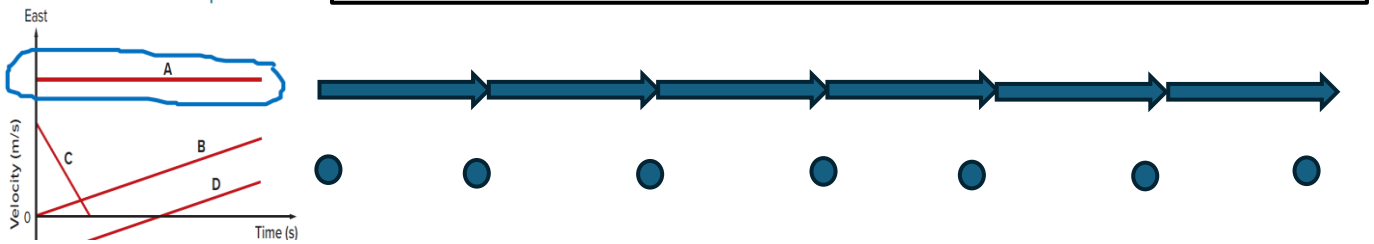


Slowing down- velocity and acceleration in different direction (+v) (-a)





Slowing down- velocity and acceleration in different direction (-v) (+a)



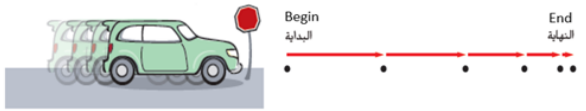
Constant velocity - acceleration (0)

16- Describe the motion of an object if its velocity and acceleration are either in the same direction or opposite directions, hence state if an object is slowing down or speeding up

Page No. 56

ESE QUESTIONS

The car in the figure travels from the Start point to the End point in a straight line with a variable speed. Which of the following statements is true about the motion of the car?

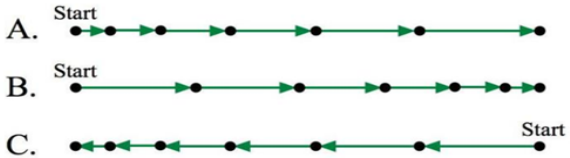


a. Velocity and acceleration remain constant in magnitude, and both are directed to the right
b. Speed decreases and acceleration is directed to the right
c. Speed decreases and acceleration is directed to the left
d. Speed increases and acceleration is directed to the left

ESE QUESTIONS

These three motion diagrams show the motion of a particle along the x-axis. Which motion diagram(s) represent to a positive acceleration?

تُوضح مخططات الحركة الثلاثة حركة جسيم على طول المحور x. أي من هذه المخططات يمثل تسارعا موجبا؟



- A & C
- B & C
- Only A
  A فقط
- Only B
  B فقط

Define free fall and free fall acceleration

Page No. 71

Free Fall: Is movement of an object caused only by the force of gravity

Free Fall Acceleration is the acceleration due to gravity

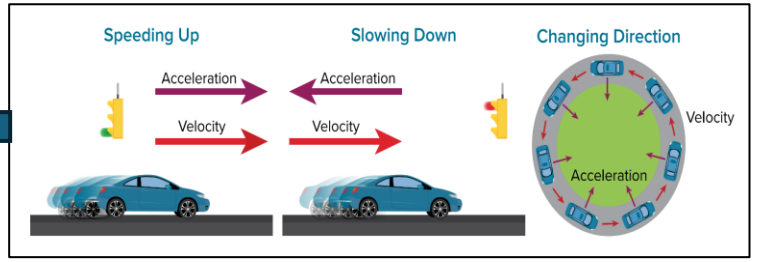
About 400 years ago, Galileo Galilei discovered that, neglecting the effect of the air, all objects in free fall have the same acceleration. It doesn't matter what they are made of or how much they are

18- Explain how an object can accelerate while moving at a constant speed

CHECK YOUR PROGRESS

11. Describing Motion What are three ways an object can accelerate?

speed up, slow down, change direction

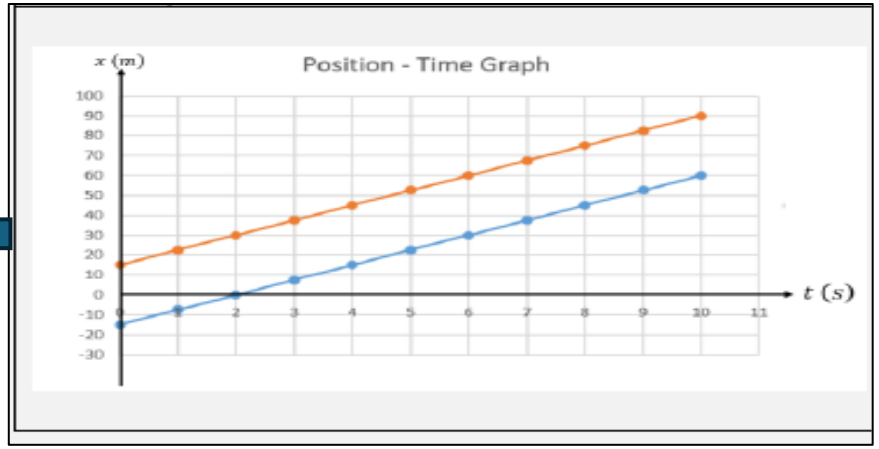


12. Position-Time and Velocity-Time Graphs Two joggers run at a constant velocity of 7.5 m/s east. **Figure 10** shows the positions of both joggers at time $t = 0$.

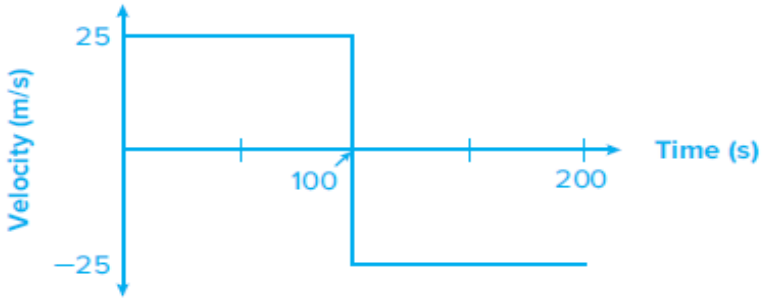
a. What would be the difference(s) in the position-time graphs of their motion?

Figure 10

Both lines would have the same slope, but they would rise from the x-axis at different points, +15 m, and −15 m.



13. Velocity-Time Graph Sketch a velocity-time graph for a car that goes east at 25 m/s for 100 s, then west at 25 m/s for another 100 s.



The car moves with constant velocity, but it accelerate because the change in the direction of motion.

19- Apply the equation of motion relating the final velocity of an object to its initial velocity, uniform acceleration, and time (vf = vi + at).

16. A golf ball rolls up a hill toward a miniature golf hole. Assume the direction toward the hole is positive.

a. If the golf ball starts with a speed of 2.0 m/s and slows down at a constant rate of 0.50 m/s^2, what is its velocity after 2.0 s?

b. What is the golf ball's velocity if the constant acceleration continues for 6.0 s?

c. Describe the motion of the golf ball in words and with a motion diagram

a

V_i = 2 m/s V_f = ?

t= 2 s a = - 0.50 m/ s^2

$V_f = V_i + \bar{a}\,\Delta t$

2+(-0.50x2)=1 m/s

1 m/s towards the hole

b

V_i = 2 m/s V_f = ?

t = 6 s a = -0.50 m/ s^2

$V_f = V_i + \bar{a}\,\Delta t$

2+(-0.50x6)=-3 m/s

3 m/s away from the hole

c. The ball's velocity decreased in the first case. In the second, the ball slowed to a stop and then began rolling back down the hill. See Online Solutions Manual.

17

A bus traveling 30.0 km/h east has a constant increase in speed of 1.5 m/s^2. What is its velocity 6.8 s later?

V_i = 30 km/h East

Vi= (30x1000)/1x60x60 = 8.3 m/s

Vi = 8.3 m/s Vf = ? t=6.8 a = 1.5 m/ s^2

$V_f = V_i + \bar{a}\,\Delta t$

8.3+(1.5x6.8)=18.5 m/s East

Or

18.533×1000/3600=66.7 km/h

67 km/h East

18

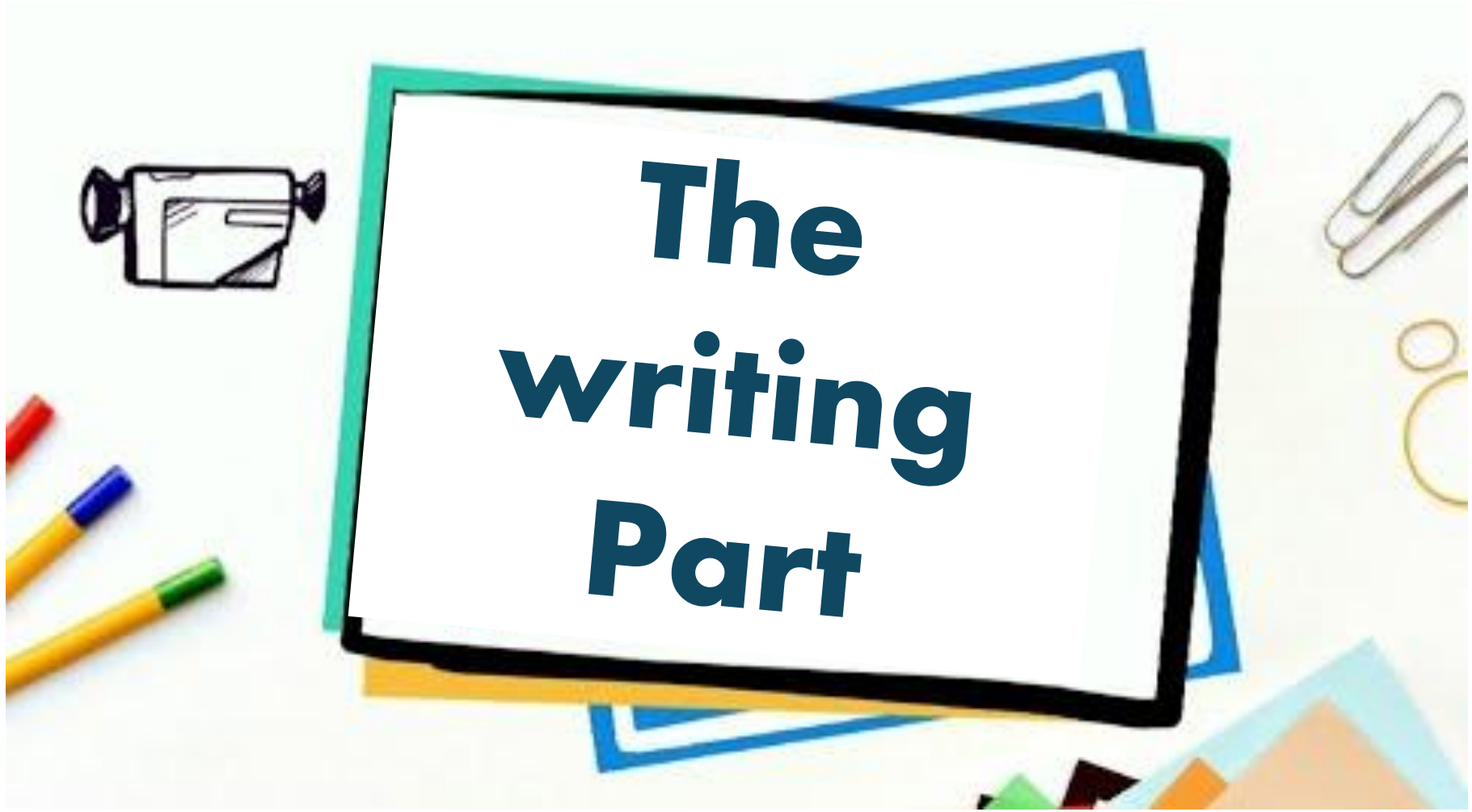
18. If a car accelerates from rest at a constant rate of 5.5 m/s^2 north, how long will it take for the car to reach a velocity of 28 m/s north?

V_i = 0 m/s V_f = 28 m/s

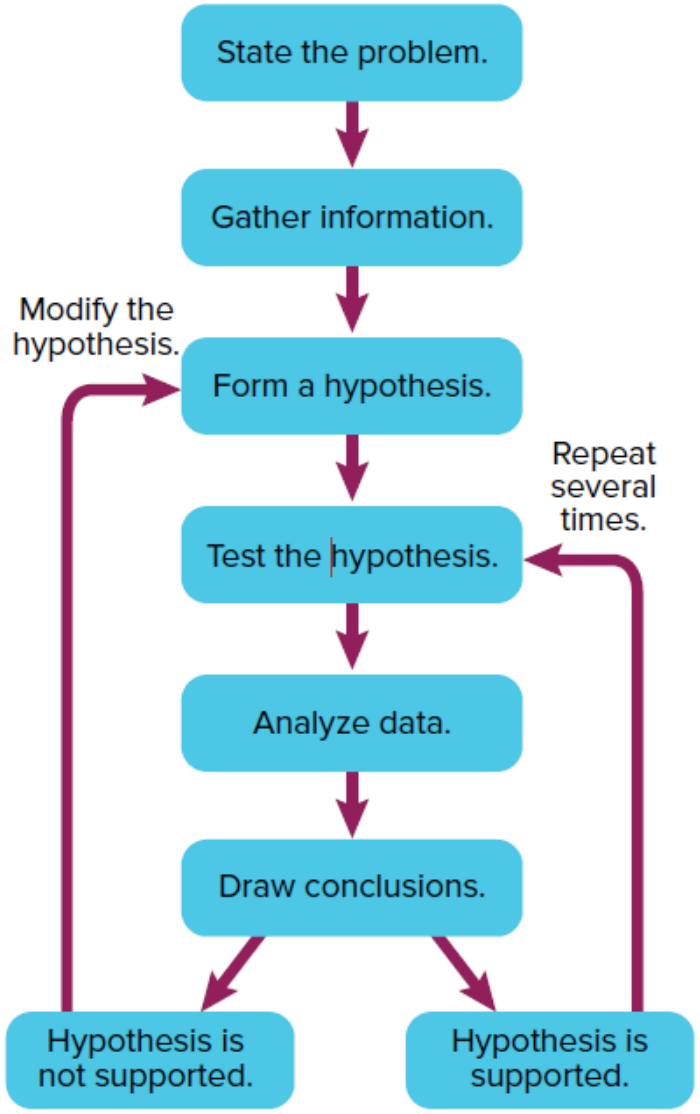
t = ? = 5.5 m/ s^2

$V_f = V_i + \bar{a}\,\Delta t$

28=0+(5.5x?)=5.1 s


The
writing
Part

List the common steps of scientific methods used in investigations
Classify common quantities into base and derived quantities with their SI units



SI Base Units

Quantity Measured	Unit	Symbol
Length	meter	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Temperature	kelvin	K
Amount of substance	mole	mol
Intensity of light	candela	cd

Derived quantity

Derived Quantity	Units
Volume, V	m^3
Density, ρ	kgm^{-3}
Velocity, v	**m/s**
Force, F	N
Acceleration, a	$\mathbf{m/s^2}$

22- -Interpret the motion represented by motion diagrams and particle models.
-Determine displacement using vector addition or subtraction in one dimension
-Define and calculate the average speed using a suitable mathematical representation
-Define and calculate the average velocity using a suitable mathematical representation

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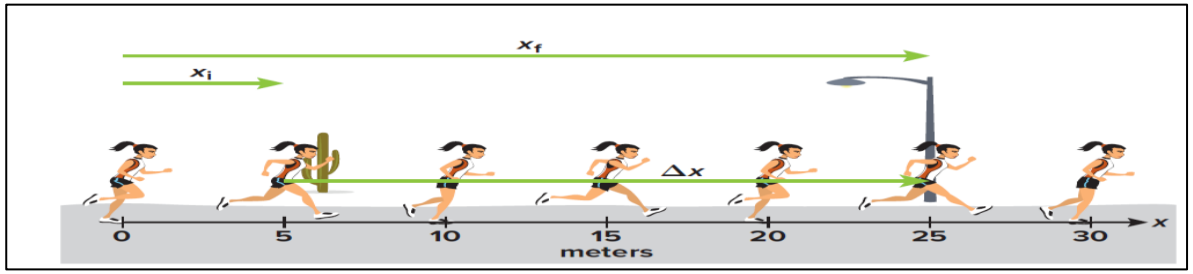
Distance The length of a path traveled between two positions (SI unit m)

Displacement
Is a change in position.
Is the distance with a given direction between starting point (x_i) and ending point (x_f)

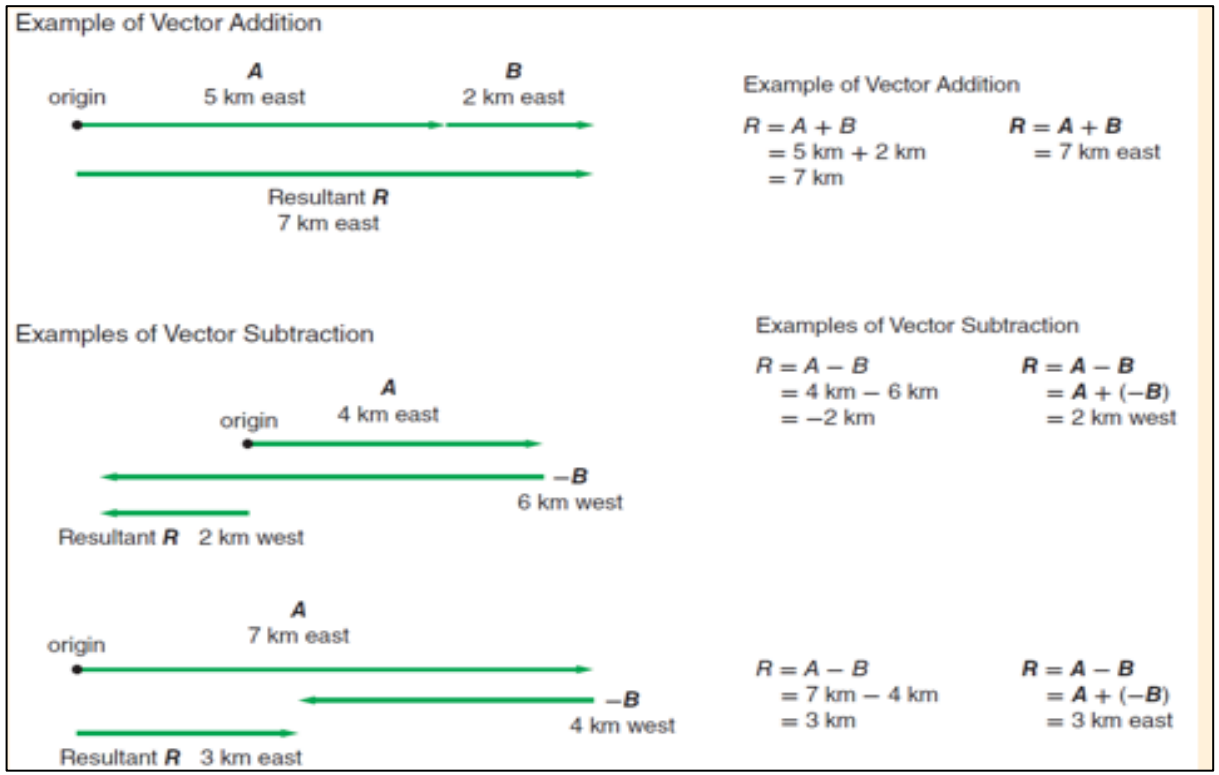


(Displacement) $\Delta x = x_f - x_i$

$x_i = 5m$ $x_f = 25m$

$\Delta x = 25 - 5 = 20m$ *East*

Distance = 25m



What is the sum of a vector of length 4 km west and a vector 6 km east?

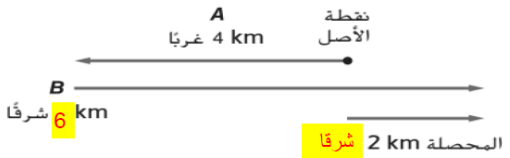
ما مجموع متجه طوله 4 km غربا ومتجه 6km شرقا

Examples of Vector Subtraction

مثال لطرح المتجهات

$R = A + B$
$= -A + B$
$= 2\ km$ شرقًا

$R = A + B$
$= -4\ km + 6\ km$
$= +2\ km$

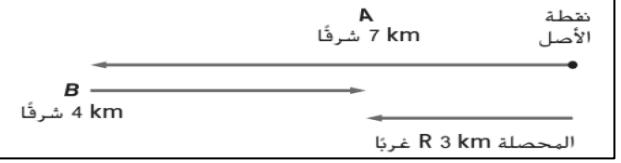


What is the sum of a vector of length 7 km west and a vector 4 km east?

ما مجموع متجه طوله 7km غربا ومتجه 4km شرقا

$R = A + B$
$= -A + B$
$= 3\ km$ غربًا

$R = A + B$
$= -7\ km + 4\ km$
$= -3\ km$



AVERAGE VELOCITY The graph at the right describes the straight-line motion of a student riding her skateboard along a smooth, pedestrian-free sidewalk. What is her average velocity? What is her average speed?

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b- The average Velocity

$$\bar{v} = \frac{x_f - x_i}{t_f - t_i}$$

$$\bar{v} = \frac{12 - 0}{7 - 0}$$

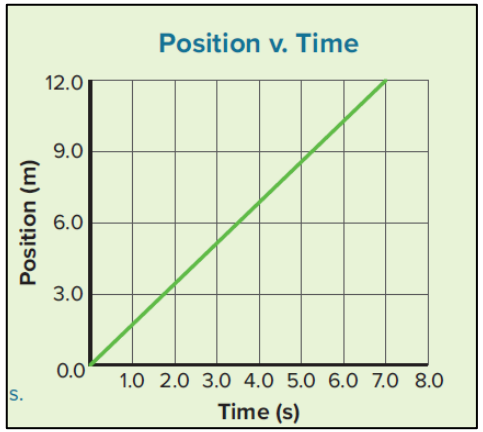
$$\bar{v} = \frac{12}{7}$$

$$\bar{v} = 1.7\ m/s \text{ in the Positive direction}$$

The average speed $\bar{v} = |1.7\ m/s|$

The average speed $\bar{v} = 1.7\ m/s$

$x_f = 12\ km$
$x_i = 0\ km$
$t_i = 0\ s$
$t_f = 7\ s$



29-The graph in Figure 22 represents the motion of a bicycle.
a. What is the standard average speed of the bicycle?
b. What is the vector average speed of the bicycle?

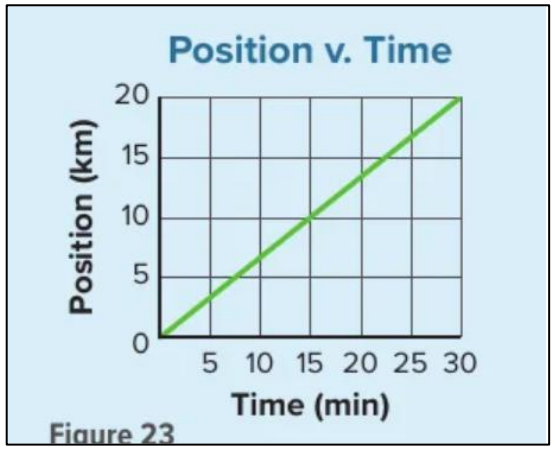


Figure 23

26- The graph in the figure shows the motion of a cruise ship sailing slowly through calm waters to the south.
a. What is the ship's average speed?
b. What is the ship's average velocity?

b- The average Velocity

$$\bar{v} = \frac{x_f - x_i}{t_f - t_i}$$

$$\bar{v} = \frac{-1 - 0}{3 - 0}$$

$$\bar{v} = \frac{-1}{3}$$

$$\bar{v} = -0.33\ m/s \text{ north}$$

a-The average speed $\bar{v} = |-0.33\ m/s|$

The average speed $\bar{v} = 0.33\ m/s$

$x_f = -1\ m$
$x_i = 0\ km$
$t_i = 0\ s$
$t_f = 3\ s$

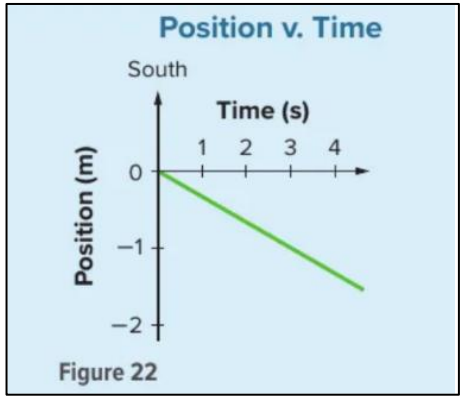


Figure 22

b- The average Velocity

$$\bar{v} = \frac{x_f - x_i}{t_f - t_i}$$

$$\bar{v} = \frac{20 - 0}{30 - 0}$$

$$\bar{v} = \frac{20}{30}$$

$$\bar{v} = 0.66\ m/s \text{ in positive direction}$$

a-The average speed $\bar{v} = |0.67\ km/min|$

The average speed $\bar{v} = 0.67\ km/min$

$x_f = 20\ km$
$x_i = 0\ km$
$t_i = 0\ min$
$t_f = 30\ min$

23-Analyze a position-time graph to describe an object's motion
-Calculate average velocity (magnitude and direction) from the slope of a position-time graph during a certain time interval and instantaneous velocity from the slope of a position-time graph at a certain instant

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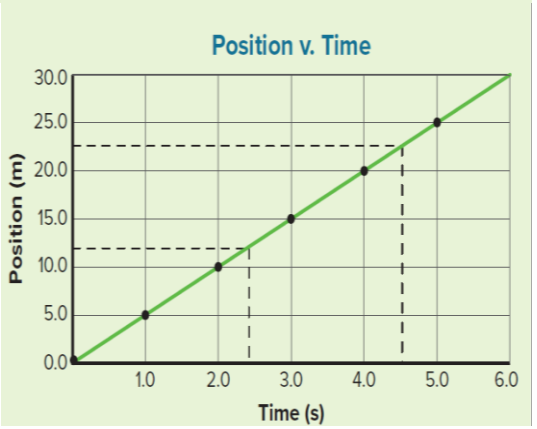
EXAMPLE Problem 1

ANALYZE A POSITION-TIME GRAPH When did the runner whose motion is described in **Figure 11** reach 12.0 m beyond the starting point? Where was she after 4.5 s?



1- 2.4 s

2- 22.5 m

10. The graph in the figure 13 represents the motion of a car moving along a straight highway. Describe in words the car's motion.

The car starts at a position 125.0 m and moves toward the origin, reaching the origin in 5.0 s after it started moving beyond the origin.

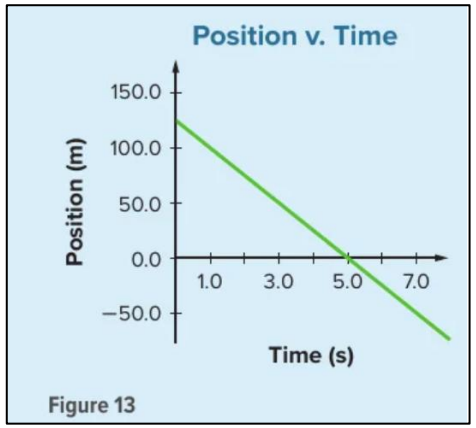
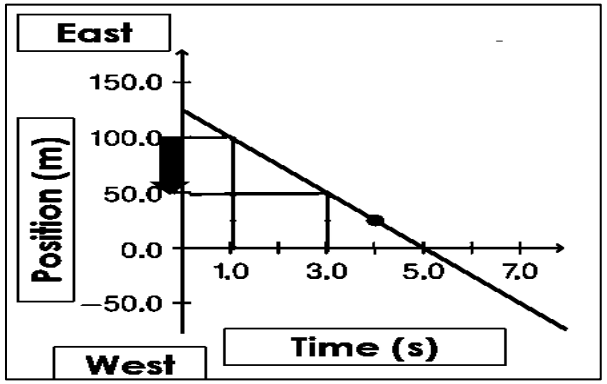


Figure 13

12. Answer the following questions about the car's motion. Assume that the positive x-direction is east of the origin and the negative x-direction is west of the origin.
a. At what time was the car's position 25.0 m east of the origin?
b. Where was the car at time t = 1.0 s?
c. What was the displacement of the car between times t = 1.0 s and t = 3.0 s?



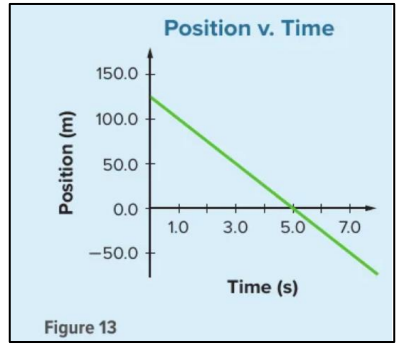


Figure 13

a-4.0 s

b-100 m

$$\Delta x = x_f - x_i$$

$$Displacemeny = 50 - 100$$

$$Displacement = -50\ m$$

$$Displacement = 50\ m\ west$$

23-Analyze a position-time graph to describe an object's motion
-Calculate average velocity (magnitude and direction) from the slope of a position-time graph during a certain time interval and instantaneous velocity from the slope of a position-time graph at a certain instant

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25. Critical Thinking Look at the diagram and graph shown in Figure 18. Do they describe the same motion? Explain. The time intervals in the particle model diagram are 2 s.

No
Both travel in positive direction, but one moving faster than the other

In particle model reach to position 10 m in 10 s
In the graph reach to position 10 m in 2.5 s

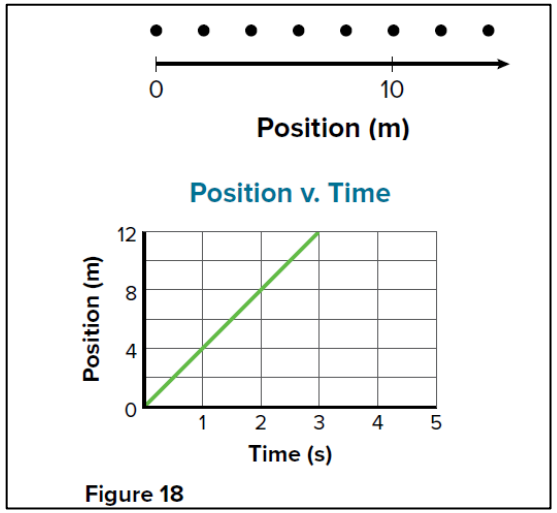

Figure 18

24-Interpret the velocity-time graph for a single or multiple objects in motion
-Find the slope and y-intercept of a velocity-time graph to describe the motion of an object

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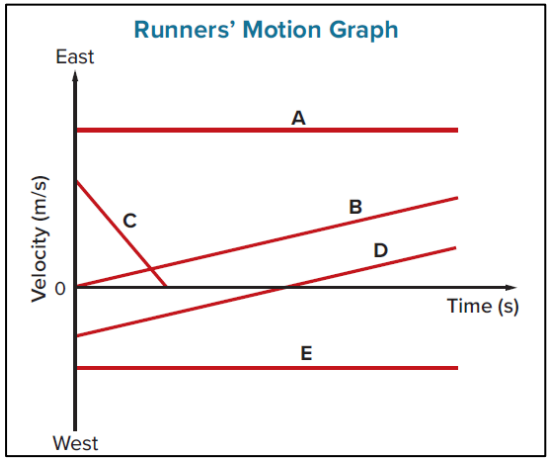
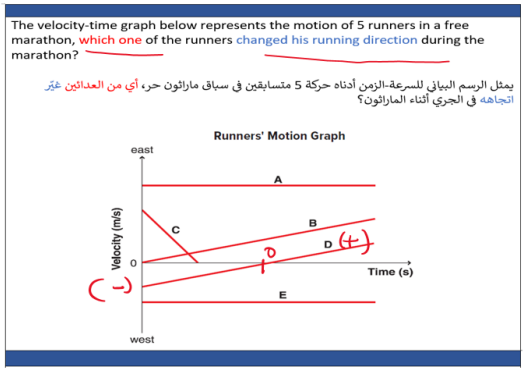


	Motion description
A	Move with constant velocity to East
B	Speeding up to East
C	Slowing down to East
D	Slowing down to west then Speeding up to East
E	Constant velocity to west

ESE QUESTIONS



Runner D
D العداء

Runner B
B العداء

Runner C
C العداء

Runner E
E العداء

24-Interpret the velocity-time graph for a single or multiple objects in motion
-Find the slope and y-intercept of a velocity-time graph to describe the motion of an object

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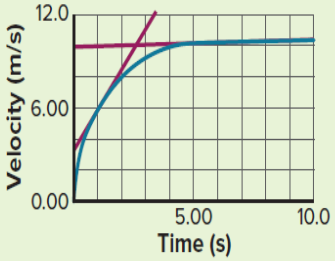
EXAMPLE Problem 1

VELOCITY AND ACCELERATION How would you describe the sprinter's velocity and acceleration as shown on the graph?



1 ANALYZE AND SKETCH THE PROBLEM

From the graph, note that the magnitude of the sprinter's velocity starts at zero, increases rapidly for the first few seconds, and then, after reaching about 10.0 m/s, remains almost constant.

KNOWN	UNKNOWN
v = varies	a = ?

2 SOLVE FOR THE UNKNOWN

Draw tangents to the curve at two points. Choose $t = 1.00$ s and $t = 5.00$ s. Solve for the magnitude of the instantaneous acceleration at 1.00 s:

$$a = \frac{\text{rise}}{\text{run}}$$ The slope of the line at 1.00 s is equal to the acceleration at that time.

$$= \frac{10.0 \text{ m/s} - 6.00 \text{ m/s}}{2.4 \text{ s} - 1.00 \text{ s}}$$

$$= 2.9 \text{ m/s/s} = 2.9 \text{ m/s}^2$$

Solve for the magnitude of the instantaneous acceleration at 5.00 s:

$$a = \frac{\text{rise}}{\text{run}}$$ The slope of the line at 5.00 s is equal to the acceleration at that time.

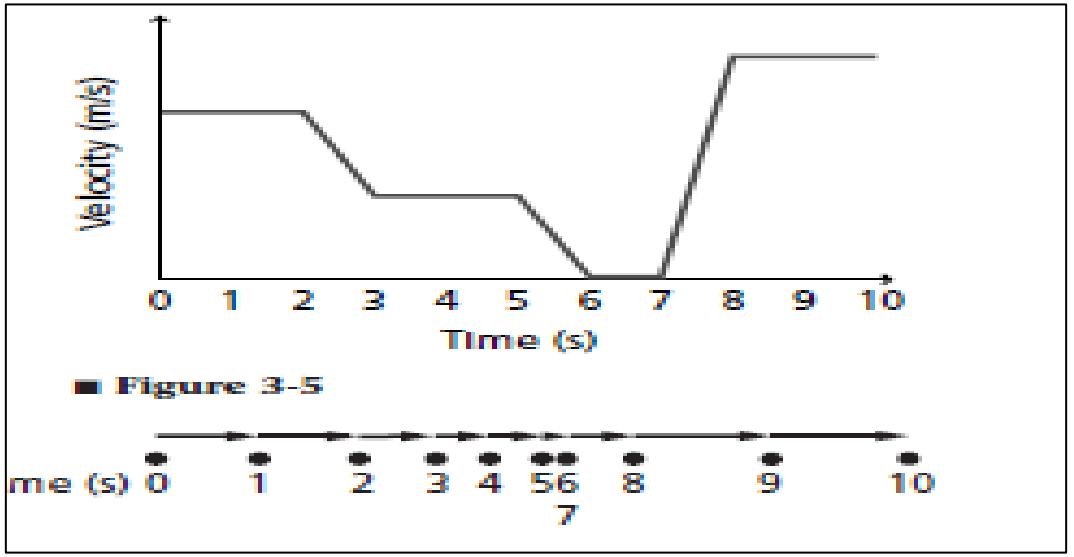
$$= \frac{10.3 \text{ m/s} - 10.0 \text{ m/s}}{10.0 \text{ s} - 0.00 \text{ s}}$$

$$= 0.030 \text{ m/s/s} = 0.030 \text{ m/s}^2$$

The acceleration is not constant because its magnitude changes from 2.9 m/s^2 at 1.00 s to 0.030 m/s^2 at 5.00 s.

The acceleration is in the direction chosen to be positive because both values are positive.

Figure 3-5 is a v-t graph for Steven as he walks along the midway at the state fair. Sketch the corresponding motion diagram, complete with velocity vectors.



The object starts motion with high velocity and high acceleration then decreased and finally moved with almost constant velocity

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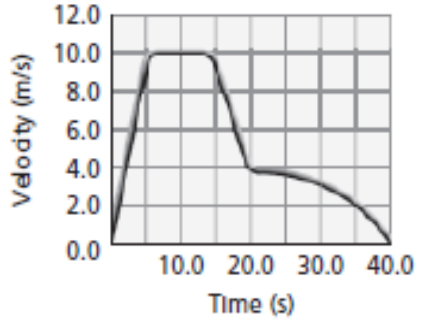
3. Refer to the v-t graph of the toy train in Figure 3-6 to answer the following questions.



a. When is the train's speed constant? 5.0 to 15.0 s

b. During which time interval is the train's acceleration positive?

0.0 to 5.0 s

c. When is the train's acceleration most negative?

15.0 to 20.0 s

Refer to Figure 3-6 to find the average acceleration of the train during the following time intervals.

a. 0.0 s to 5.0 s

$$\bar{a} = \frac{v_2 - v_1}{t_2 - t_1}$$

$$= \frac{10.0\ \text{m/s} - 0.0\ \text{m/s}}{5.0\ \text{s} - 0.0\ \text{s}}$$

$$= 2.0\ \text{m/s}^2$$

b. 15.0 s to 20.0 s

$$\bar{a} = \frac{v_2 - v_1}{t_2 - t_1}$$

$$= \frac{4.0\ \text{m/s} - 10.0\ \text{m/s}}{20.0\ \text{s} - 15.0\ \text{s}}$$

$$= -1.2\ \text{m/s}^2$$

c. 0.0 s to 40.0 s

$$\bar{a} = \frac{v_2 - v_1}{t_2 - t_1} = \frac{0.0\ \text{m/s} - 0.0\ \text{m/s}}{40.0\ \text{s} - 0.0\ \text{s}}$$

$$= 0.0\ \text{m/s}^2$$

5. Plot a v-t graph representing the following motion. An elevator starts at rest from the ground floor of a three-story shopping mall. It accelerates upward for 2.0 s at a rate of 0.5 m/s^2, continues up at a con-stant velocity of 1.0 m/s for 12.0 s, and then experiences a constant downward acceleration of 0.25 m/s^2 for 4.0 s as it reaches the third floor.