HW1 - due 6 pm Day 3 (Wed. Jul. 30)

| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

1.   Question Details   OSColPhys1 2.P.044.WA. [2707249]

A child operates a remote controlled toy car on a linear track. The figure below plots the car's position as a function of time.
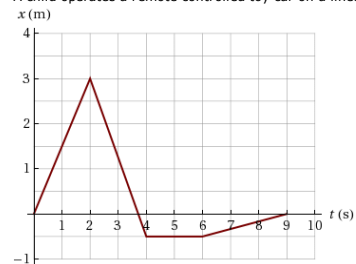
Find the velocity of the toy car over the following time intervals. Indicate the direction with the sign of your answer.

(a) From 0 s to 2 s

[   ] m/s

(b) From 2 s to 4 s

[   ] m/s

(c) From 4 s to 6 s

[   ] m/s

(d) From 6 s to 9 s

[   ] m/s

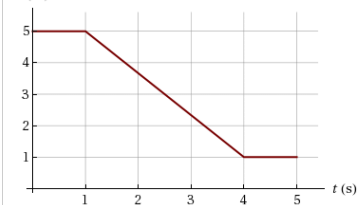**Supporting Materials**

Physical Constants

2.   Question Details   OSColPhys1 2.P.042.Tutorial.WA. [2707433]

(a) The graph below plots the **position** versus time for an object moving in one dimension along the x direction.

What is the speed (magnitude of velocity) of the object at $t = 2.5$ s?

[   ] m/s

What direction is the object moving along that time?

○ $+x$

○ $-x$

○ The object is not moving.

What is the acceleration of the object at $t = 2.5$ s? (Indicate the direction with the sign of your answer.)

[   ] m/s^2

Is the speed increasing, decreasing or constant at that time?

○ increasing

○ decreasing

○ constant

(b) The graph below plots the **velocity** versus time for an object, different from the one in part (a), moving in one dimension along the x direction.

What is the speed (magnitude of velocity) of the object at $t = 2.5$ s?

[   ] m/s

What direction is the object moving along that time interval?

○ $+x$

○ $-x$

○ The object is not moving.

What is the acceleration of the object at $t = 2.5$ s? (Indicate the direction with the sign of your answer.)

[   ] m/s^2

Is the speed increasing, decreasing or constant at that time?

○ increasing

○ decreasing

○ constant
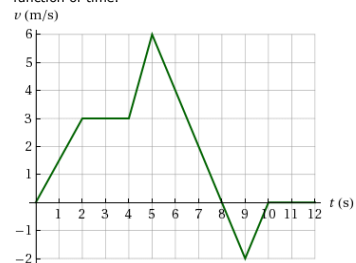
Supporting Materials

Physical Constants

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3.   Question Details   OSColPhys1 2.P.045.WA. [2707296]

A particle is restricted to move along one dimension, the x-axis. The graph below plots the velocity of the particle as a function of time.

(a) What is the acceleration of the particle during the following intervals? Indicate the direction with the sign of your answer.

0 s to 2 s	[ ]	m/s^2
2 s to 4 s	[ ]	m/s^2
4 s to 5 s	[ ]	m/s^2
5 s to 9 s	[ ]	m/s^2
9 s to 10 s	[ ]	m/s^2
10 s to 12 s	[ ]	m/s^2

(b) At the following instants in time, what is the direction of the particle's velocity?

$t = 1.0$ s	---Select---
$t = 3.0$ s	---Select---
$t = 6.0$ s	---Select---
$t = 8.0$ s	---Select---
$t = 8.5$ s	---Select---
$t = 9.5$ s	---Select---
$t = 11.0$ s	---Select---

Supporting Materials

Physical Constants

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4.   Question Details   OSColPhys1 2.P.017.WA. [2707320]

Suppose you are looking down from a helicopter at three cars traveling in the same direction along a freeway. The positions of the three cars every 2 seconds are represented by dots on the diagram. The positive direction is to the right.

(a) Which car is traveling at a constant speed?

○ Car A

○ Car B

○ Car C

○ All cars are traveling at a constant speed.

○ None of the cars are traveling at a constant speed.

(b) During which time interval do Car A and Car B have the same average speed?

○ t_1 to t_2

○ t_2 to t_3

○ t_3 to t_4

○ t_4 to t_5

(c) Which car has the greatest average velocity during the time interval t_1 to t_2?

○ Car A

○ Car B

○ Car C

(d) Which car has the greatest average velocity during the time interval t_4 to t_5?

○ Car A

○ Car B

○ Car C

(e) At which time does Car B catch up with Car A?

○ t_2

○ t_3

○ t_4

○ t_5

(f) During what time interval does Car C pass Car A?

○ t_1 to t_2

○ t_2 to t_3

○ t_3 to t_4

○ t_4 to t_5

(g) At what time does Car A catch Car C?

○ t_2

○ t_3

○ t_4

○ t_5

○ t_6

(h) During what time interval does Car B pass Car C?

○ t_1 to t_2

○ t_2 to t_3

○ t_3 to t_4

○ t_4 to t_5

(i) Which car has an acceleration in the positive direction?

○ Car A

○ Car B

○ Car C

(j) Which car has an acceleration in the negative direction?

○ Car A

○ Car B

○ Car C

Supporting Materials

Physical Constants

5.   Question Details   OSColPhys1 2.P.003.WA. [2707378]

Two soccer players kick a soccer ball back and forth along a straight line. The first player kicks the ball 14 m to the right to the second player. The second player kicks the ball to the left weakly; it only moves 2.9 m before stopping. (Consider the right to be the positive direction. Where applicable, indicate the direction with the sign of your answer.)

(a) What is the total distance that the ball moved?

[   ] m

(b) At the end, what is the displacement of the ball (from the first player)?

[   ] m

Supporting Materials

Physical Constants

6.   Question Details   OSColPhys1 2.P.005.WA. [2707427]

Nerve impulses in the human body travel at a speed of about 100 m/s. A 1.6 m tall man accidentally drops a hammer on his toe. How long does it take for the nerve impulse to travel from his toe to his brain?

[   ] s

Supporting Materials

Physical Constants

7.   Question Details   OSColPhys1 2.P.006.WA. [2707441]

A car moves in a straight line at a speed of 54.0 km/h.

(a) How far will the car move in 2.00 minutes at this speed?

[   ] km

(b) How long will it take the car to move 0.26 km at this speed?

[   ] s

Supporting Materials

Physical Constants

8.   Question Details   OSColPhys1 2.P.007.WA. [2707274]

A woman drives a car from one city to another with different constant speeds along the trip. She drives at a speed of 70.0 km/h for 25.0 min, 50.0 km/h for 20.0 min, makes a stop for 45.0 min, then continues at 45.0 km/h for 35.0 min, at which point she reaches her destination.

(a) What is the total distance between her starting point and destination (in km)?

[   ] 🔑 72.1 km

(b) What is the average speed for the entire trip (in units of km/h)?

[   ] 🔑 34.6 km/h

Supporting Materials

Physical Constants

9.   Question Details   OSColPhys1 2.4.018. [2153220]

A commuter backs her car out of her garage with a constant acceleration of 1.30 m/s^2.

(a) How long does it take her to reach a speed of 1.80 m/s?

[   ] 🔑 1.38 s

(b) If she then brakes to a stop in 0.8 s, what is her (constant) deceleration?

[   ] 🔑 2.25 m/s^2

10.   Question Details   OSColPhys1 2.5.023. [2153699]

(a) A light-rail commuter train accelerates at a rate of 1.35 m/s^2. How long does it take it to reach its top speed of 80.0 km/h starting from rest?

[   ] 🔑 16.5 s

(b) The same train ordinarily decelerates at a rate of 1.85 m/s^2. How long does it take to come to a stop from its top speed?

[   ] 🔑 12 s

(c) In emergencies the train can decelerate more rapidly, coming to rest from 80.0 km/h in 8.30 s. What is its emergency deceleration in m/s^2?

[   ] 🔑 2.68 m/s^2

11.   Question Details   OSColPhys1 2.5.028. [2153674]

A powerful motorcycle can accelerate from rest to 27.8 m/s (62 mi/h) in only 1.90 s.

(a) What is its (constant) acceleration?

🔑 14.6 m/s^2

(b) How far does it travel in that time?

🔑 26.4 m

12.   Question Details   OSColPhys1 2.P.019.WA. [2707267]

Starting from rest, a runner at a track meet reaches a speed of 7.7 m/s in 1.9 s. How far does she run during this time, assuming her acceleration is uniform?

[   ] 🔑 7.32 m

Supporting Materials

Physical Constants

13.   Question Details   OSColPhys1 2.P.027.WA. [2707335]

Starting from rest, a truck travels in a straight line for 9.0 s with a uniform acceleration of +1.7 m/s^2. The driver then applies the brakes for 2.0 s, causing a uniform acceleration of −3.0 m/s^2 over that time.

(a) What is the truck's speed at the end of the braking period?

[   ] 🔑 9.3 m/s

(b) What is the total distance traveled by the truck (from the point where it started at rest to the end of the braking period)?

[   ] 🔑 93.5 m

Supporting Materials

Physical Constants

14.   Question Details   OSColPhys1 2.P.025.WA. [2707268]

A particular airplane will reach liftoff at a speed of 120 km/h.

(a) What minimum constant acceleration does the airplane require for it to liftoff after a takeoff run of 260 m? (Enter the magnitude only.)

[   ] 🔑 2.14 m/s^2

(b) How long does it take the airplane to reach liftoff speed?

[   ] 🔑 15.6 s

Supporting Materials

Physical Constants

15.   Question Details   OSColPhys1 2.P.032.WA. [2707375]

A cannon fires a shell straight upward; 2.3 s after it is launched, the shell is moving upward with a speed of 18 m/s. Assuming air resistance is negligible, find the speed (magnitude of velocity) of the shell at launch and 5.1 s after the launch.

(a) at launch

[ ] 🔑 40.5 m/s

(b) 5.1 s after the launch

[ ] 🔑 9.44 m/s

Supporting Materials

Physical Constants

16.   Question Details   OSColPhys1 2.P.037.WA. [2707278]

You throw a softball straight upward with an initial speed of 6.5 m/s. Assume air resistance is negligible.

(a) How long does it take for the softball to return to your hand (assuming your hand stays in the same position)?

[ ] 🔑 1.33 s

(b) How long does it take for the softball to reach its maximum height?

[ ] 🔑 0.663 s

Supporting Materials

Physical Constants

17.   Question Details   OSColPhys1 2.P.038.Tutorial.WA. [2707291]

Jack drops a stone from rest off of the top of a bridge that is 23.2 m above the ground. After the stone falls 6.8 m, Jill throws a second stone straight down. Both rocks hit the water at the exact same time. What was the initial velocity of Jill's rock? Assume upward is the positive direction and downward is negative. (Indicate the direction with the sign of your answer.)

[ ] 🔑 -18.4 m/s

Supporting Materials

Physical Constants

18.   Question Details   OSColPhys1 2.P.033.WA. [2707265]

You launch a model rocket from ground level. It moves directly upward with a constant acceleration of 60.0 m/s^2 for 1.10 seconds, at which point it runs out of fuel. Assuming air resistance on the rocket is negligible, what is the maximum altitude (above the ground) achieved by the rocket?

[ ] 🔑 259 m

Supporting Materials

Physical Constants

Assignment Details