This print-out should have 65 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. The due time is Central time.

This is the first part of your final exam review. Since the server will be down on Wednesday, please print your version and bring it to class on Wednesday.

We will work on the review Wednesday, Thursday, and Friday.

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001 (part 1 of 4) 10 points

Use significant figures to calculate the following:

a) Find the sum of the measurements 758 g, 37.4 g, 0.89 g, and 2.3 g.

1. Whole number (799 g)

2. Tenths (798.6 g)

3. Hundredths (798.59 g)

4. Three significant figures (799 g)

5. Tens (800 g)

6. Two significant figures (800 g)

7. One significant figure (800 g)

8. None of these

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002 (part 2 of 4) 10 points

b) Find the quotient $\frac{3.2\text{ m}}{3.562\text{ s}}$.

1. Hundredths (0.90 m/s)

2. Thousandths (0.898 m/s)

3. None of these

4. Three significant figures (0.898 m/s)

5. Two significant figures (0.90 m/s)

6. Tenths (0.9 m/s)

7. Four significant figures (0.8984 m/s)

8. One significant figure (0.9 m/s)

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003 (part 3 of 4) 10 points

c) Find the product of 5.77 mm and π.

1. Thousandths (18.127 mm)

2. Whole number (18 mm)

3. None of these

4. Hundredths (18.13 mm)

5. Three significant figures (18.1 mm)

6. Tenths (18.1 mm)

7. Five significant figures (18.127 mm)

8. Two significant figures (18 mm)

9. Four significant figures (18.13 mm)

---

004 (part 4 of 4) 10 points

d) Find the difference of 27.52 s and 3.3 s.

1. Four significant figures (24.22 s)

2. Tenths (24.2 s)

3. Two significant figures (24 s)

4. None of these

5. Three significant figures (24.2 s)

6. Hundredths (24.22 s)

7. Tens (20 s)

8. Whole number (24 s)

9. One significant figure (20 s)

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005 (part 1 of 1) 10 points

How does the thickness of paint sprayed on a surface change when the sprayer is held twice as far away?

1. doubles

2. quadruples

3. halves

4. remains the same

5. drops to one quater of the original value

6. more information is needed to answer the question

---

006 (part 1 of 1) 10 points

A bat flying in a cave emits a sound and receives its echo 0.6 s later.

How far away is the cave wall? (Assume the speed of sound to be 340 m/s.) Answer in units of m.

---

007 (part 1 of 1) 10 points

An airplane starts from A and goes to B at a constant speed. After reaching B it returns to A at the same speed. There was no wind. Now, assume there was a wind from A to B of constant magnitude.

Assume: The wind speed is less than that of the plane (*i.e.*, in magnitude).

When will the round trip take more time when there is a wind or when there is no wind?

1. Insufficient data.

2. Time taken is more when there is constant wind.

3. Time taken is more when there is no wind.

4. Same in both cases because one way the wind helps you and the other way it troubles you.

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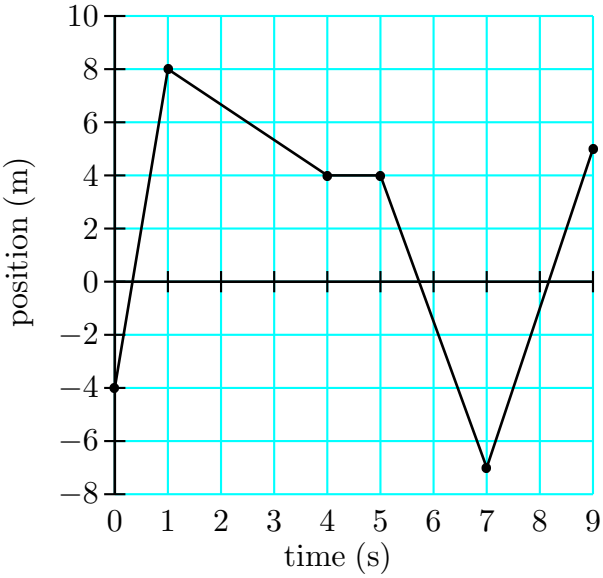
008 (part 1 of 4) 10 points

The position versus time for a certain object moving along the x-axis is shown. The object's initial position is -4 m.



Find the instantaneous velocity at 0.5 s. Answer in units of m/s.

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009 (part 2 of 4) 10 points

Find the instantaneous velocity at 6 s. Answer in units of m/s.

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010 (part 3 of 4) 10 points

Find the average velocity between 0 s and 4 s. Answer in units of m/s.

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011 (part 4 of 4) 10 points

Find the average velocity over the whole time shown. Answer in units of m/s.

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012 (part 1 of 3) 10 points

Consider the acceleration of gravity to be 10 m/s^2 .

What is the magnitude of the instantaneous velocity (speed) of a freely falling object 35 s after it is released from a position of rest? Answer in units of m/s.

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013 (part 2 of 3) 10 points

What is its average speed during this 35 s interval? Answer in units of m/s.

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014 (part 3 of 3) 10 points

How far will it fall during this time? Answer in units of m.

---

015 (part 1 of 1) 10 points

Chuck drove 35 mi from Austin to San Marcos in 40 min, stopped 30 min for a hamburger, and then drove 45 mi to San Antonio in 50 min. What was Chuck's average speed?

1. 30 mph

2. 43 mph

3. 50 mph

4. 56 mph

5. 53 mph

6. 40 mph

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016 (part 1 of 1) 10 points

If your car goes from 0 mi/h to 70 mi/h in 6 s, what is your average acceleration?

Answer in units of $\frac{\text{miles}}{\text{h} \cdot \text{s}}$.

---

017 (part 1 of 1) 10 points

Harry says acceleration is how fast you go. Carol says acceleration is how fast you get fast. They look to you for confirmation.

Who is correct?

1. Harry is correct.

2. Neither is correct.

3. Carol is correct.

4. They are both correct in different aspects.

5. It cannot be determined by the information given.

---

018 (part 1 of 1) 10 points

Which of the following is an example of something that undergoes acceleration while moving at constant speed?

1. A football flying in the air

2. A car making a circle in a parking lot

3. None of these. An object that undergoes an acceleration has to change its speed

4. A man standing in an elevator

5. A car moving straight backwards on the road

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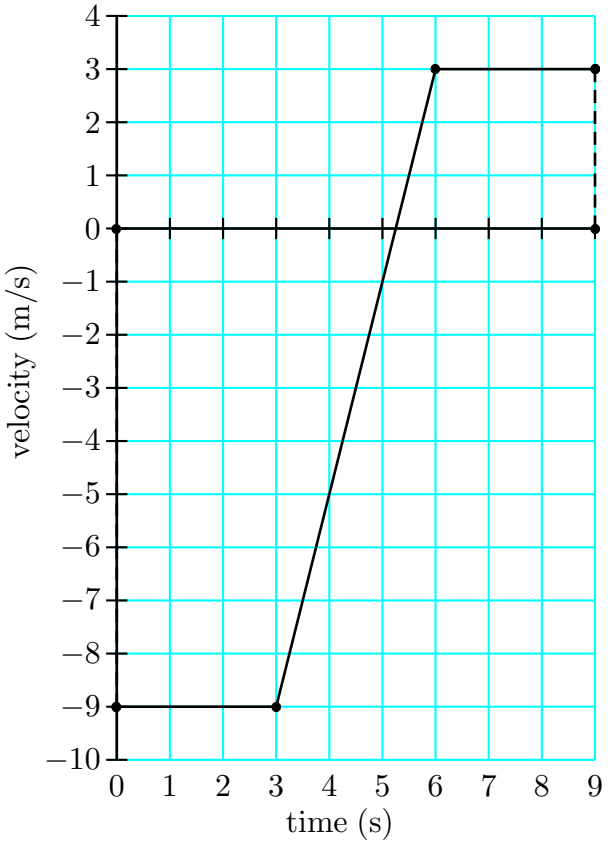
019 (part 1 of 6) 10 points

Consider the plot below describing motion of an object along a straight path as shown in the figure below.



Find the average acceleration during the time interval 0 s to 3 s. Answer in units of m/s^2.

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020 (part 2 of 6) 10 points

Find the average acceleration during the time interval 3 s to 6 s. Answer in units of m/s^2.

021 (part 3 of 6) 10 points
Find the average acceleration during the time interval 0 s to 9 s. Answer in units of $\mathrm{m/s^2}$.

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022 (part 4 of 6) 10 points
Find the instantaneous acceleration at 2 s. Answer in units of $\mathrm{m/s^2}$.

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023 (part 5 of 6) 10 points
Find the instantaneous acceleration at 4 s. Answer in units of $\mathrm{m/s^2}$.

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024 (part 6 of 6) 10 points
Find the instantaneous acceleration at 7 s. Answer in units of $\mathrm{m/s^2}$.

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025 (part 1 of 2) 10 points
A car with an initial speed of 23.4 km/h accelerates at a uniform rate of 0.92 $\mathrm{m/s^2}$ for 4.7 s.

a) Find the final speed of the car. Answer in units of m/s.

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026 (part 2 of 2) 10 points
b) Find the displacement of the car after that time. Answer in units of km.

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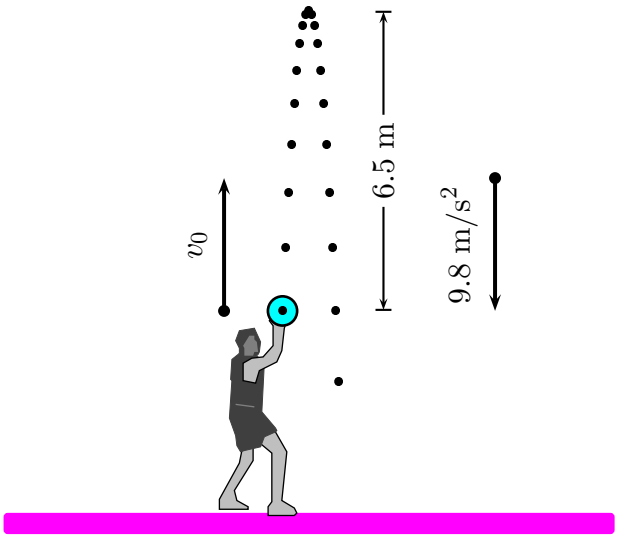
027 (part 1 of 1) 10 points
When Maggie applies the brakes of her car, the car slows uniformly from 15.5 m/s to 0 m/s in 2.35 s.

How many meters before a stop sign must she apply her brakes in order to stop at the sign? Answer in units of m.

---

028 (part 1 of 1) 10 points
A ball is thrown upward. Its initial vertical speed, acceleration of gravity is 9.8 $\mathrm{m/s^2}$, and maximum height is 6.5 m, as shown in the figure below.

Neglect: Air resistance.



What is its time interval, t_{up} (in terms of the maximum height), between the release of the ball and the time it reaches its maximum height? Answer in units of s.

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029 (part 1 of 1) 10 points
A ball is thrown straight up and reaches a maximum height in 8.78 s.

The acceleration of gravity is 9.8 $\mathrm{m/s^2}$.

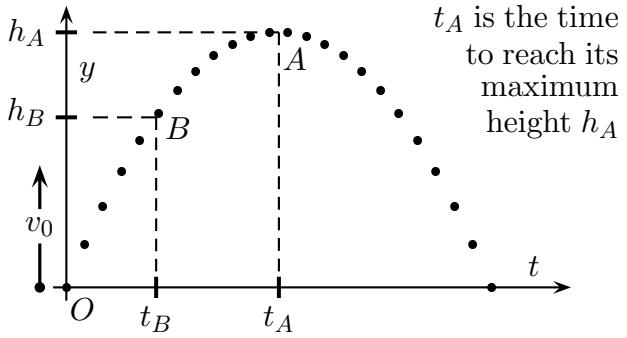

Figure is *not* drawn to scale.

What was its initial speed? Answer in units of m/s.

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030 (part 1 of 1) 10 points
You and your friend throw balloons filled with water from the roof of a several story apartment house. You simply drop a balloon from rest. A second balloon is thrown downward by your friend 3.9 s later with an initial speed of 76.44 m/s. They hit the ground simultaneously.

The acceleration of gravity is 9.8 $\mathrm{m/s^2}$. You can neglect air resistance.

How high is the apartment house? Answer in units of m.

031 (part 1 of 1) 10 points

Suppose that a freely falling object were somehow equipped with an odometer.

Would the readings of distance fallen each second indicate equal or different falling distances for successive seconds?

1. All are wrong.

2. Initially equal distances fallen in successive seconds, then greater distances fallen in successive seconds

3. Greater distances fallen in successive seconds

4. Smaller distances fallen in successive seconds

5. Equal distances fallen in successive seconds

032 (part 1 of 1) 10 points

If you drop an object, its acceleration toward the ground is 10 m/s^2.

If you throw it down instead, what is its acceleration?

1. It depends on the force of throwing.

2. Greater than 10 m/s^2

3. All are wrong.

4. Smaller than 10 m/s^2

5. 10 m/s^2

033 (part 1 of 1) 10 points

You are throwing a ball straight up in the air. At the highest point, the ball's velocity and acceleration are

1. velocity is not zero, acceleration is zero

2. velocity is zero, acceleration is zero

3. velocity is zero, acceleration is not zero

4. velocity is not zero, acceleration is not zero

034 (part 1 of 1) 10 points

Which of the following are scalar quantities, which are vector quantities?

a) velocity.
b) age.
c) speed.
d) acceleration.
e) temperature.

1. Vectors: velocity, acceleration; Scalars: age, temperature, speed

2. Vector: velocity; Scalars: age, temperature, speed, acceleration

3. All are vectors.

4. Vectors: age, temperature, speed; Scalars: velocity, acceleration

5. All are scalars.

035 (part 1 of 1) 10 points

A hunter wishes to cross a river that is 1.2 km wide and that flows with a speed of 4.4 km/h. The hunter uses a small powerboat that moves at a maximum speed of 13 km/h with respect to the water.

What is the time necessary for crossing if the boat moves directly across the river? Draw the vectors to scale on a graph to determine the answer. Answer in units of min. Your answer must be within $\pm$ 5%.

036 (part 1 of 2) 10 points

A roller coaster travels 34.5 m at an angle of 32.0° above the horizontal.

a) How far does it move horizontally? Answer in units of m.

037 (part 2 of 2) 10 points

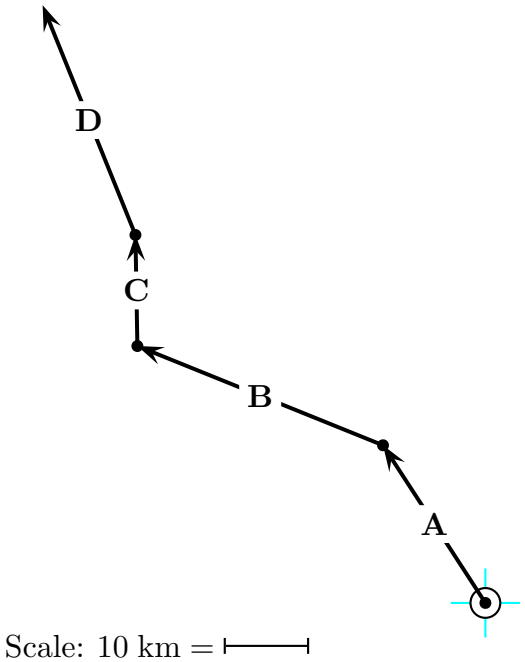
b) How far does it move vertically? Answer in units of m.

038 (part 1 of 1) 10 points

All angles are measured in a counter-clockwise direction from the positive x-axis.

A hiker makes four straight-line walks (**A**, **B**, **C**, and **D**) in random directions and lengths starting at position $(41\text{ km}, 41\text{ km})$, listed below and shown below in the plot.

A	22 km	at	123°
B	31 km	at	158°
C	13 km	at	91°
D	29 km	at	112°



Scale: 10 km =

Figure: Drawn to scale.

Select the vector which will return the hiker to the starting point by identifying the vector **E** (described below) with the diagram above.

1. $\|\vec{E}\| = 38.5514\text{ km}$, $\theta_e = 299.723°$

2. $\|\vec{E}\| = 8.74586\text{ km}$, $\theta_e = 88.9361°$

3. $\|\vec{E}\| = 46.5075\text{ km}$, $\theta_e = 71.1038°$

4. $\|\vec{E}\| = 21.0512\text{ km}$, $\theta_e = 95.6271°$

5. $\|\vec{E}\| = 76.2538\text{ km}$, $\theta_e = 49.2721°$

6. $\|\vec{E}\| = 18.9227\text{ km}$, $\theta_e = 19.1792°$

7. $\|\vec{E}\| = 44.5512\text{ km}$, $\theta_e = 242.331°$

8. $\|\vec{E}\| = 87.0506\text{ km}$, $\theta_e = 306.529°$

9. $\|\vec{E}\| = 15.2785\text{ km}$, $\theta_e = 102.327°$

10. $\|\vec{E}\| = 34.742\text{ km}$, $\theta_e = 331.178°$

039 (part 1 of 1) 10 points

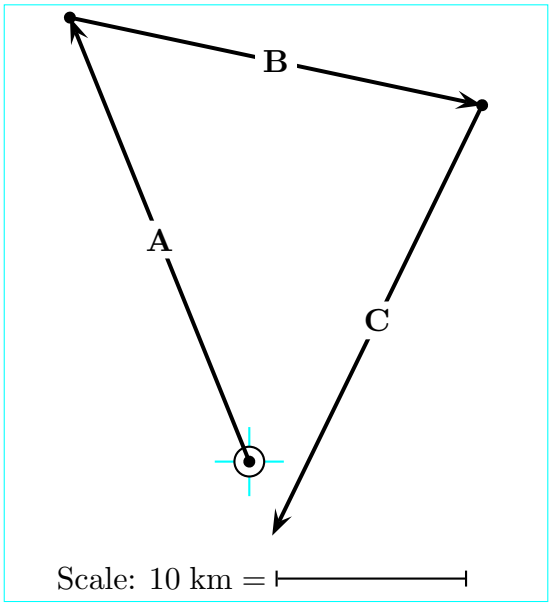
All angles are measured in a counter-clockwise direction from the positive x-axis.

A hiker makes four straight-line walks (**A**, **B**, **C**, and **D**) in random directions and lengths starting at position $(41\text{ km}, 41\text{ km})$, listed below and shown below in the plot.

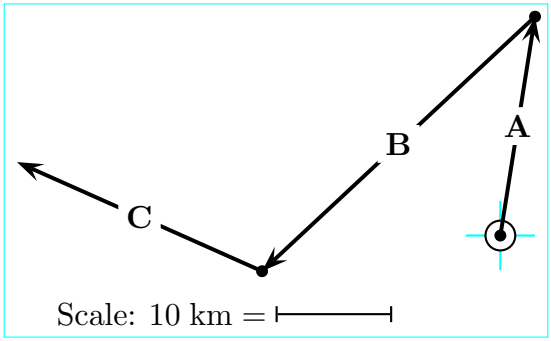
A	20 km	at	158°
B	11 km	at	283°
C	27 km	at	204°

Select the vector diagram which best represents this hike.

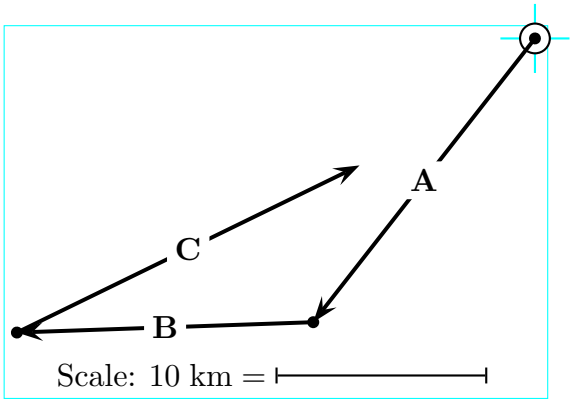
1.



2.



3.



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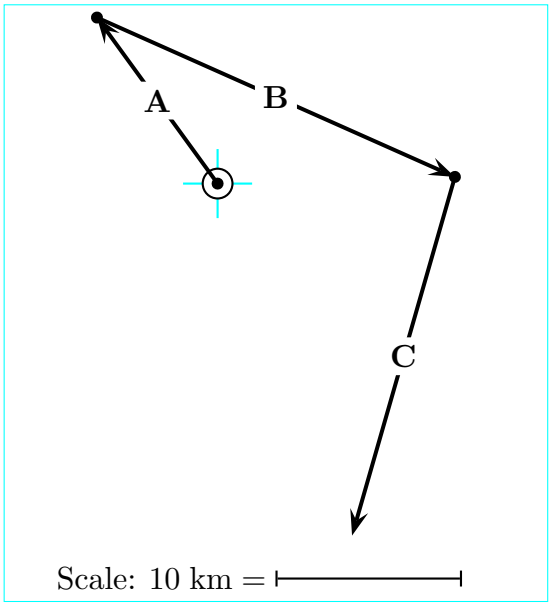
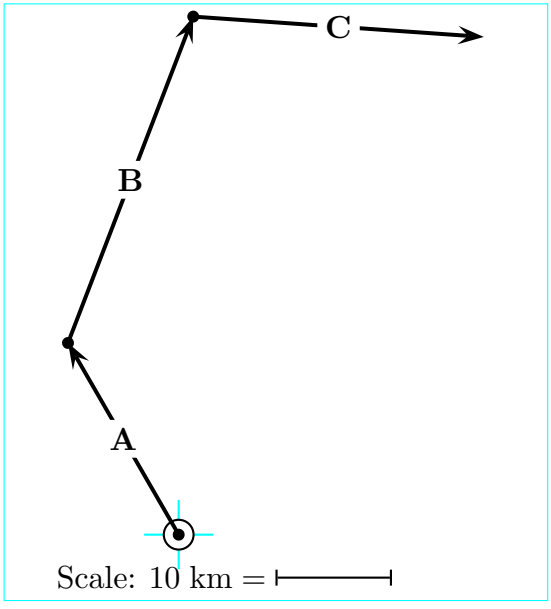
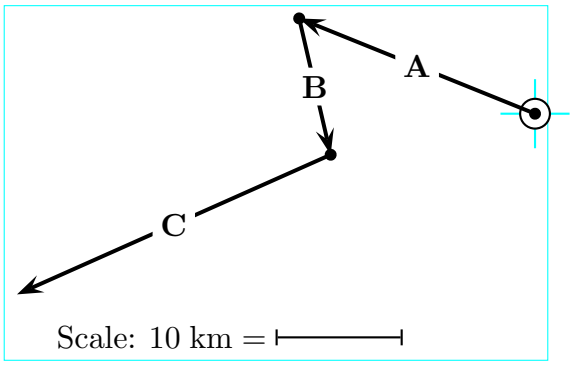


5.



6.



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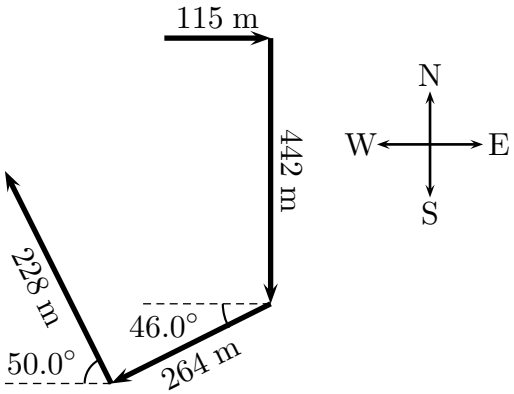
040 (part 1 of 2) 10 points

A person walks the path shown. The total trip consists of four straight-line paths.



Note: Figure is not drawn to scale.

a) At the end of the walk, what is the magnitude of the person's resultant displacement measured from the starting point? Answer in units of m.

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041 (part 2 of 2) 10 points

b) What is the direction (measured from due west, with counterclockwise positive) of the person's resultant displacement? Answer in units of °.

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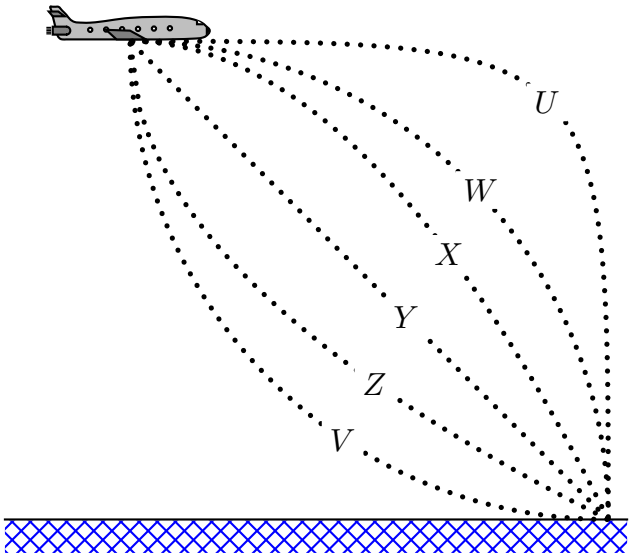
042 (part 1 of 1) 10 points

A bowling ball accidentally falls out of the cargo bay of an airliner as it flies along in a horizontal direction.



As observed by a person standing on the ground and viewing the plane as in the figure, which path would the bowling ball most closely follow after leaving the airplane?

1. W

2. Z

3. U

4. X

5. V

6. Y

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043 (part 1 of 1) 10 points

If you are standing in a bus that moves at constant velocity and drop a ball from your outstretched hand, you will see its path as a vertical straight line.

How will the path appear to a friend standing at the side of the road?

1. The path is a straight line slanted down.

2. The path is a straight line orientated vertically.

3. The path curves upward.

4. The path curves downward.

---

044 (part 1 of 1) 10 points

An autographed baseball rolls off of a 1.2 m high desk and strikes the floor 0.59 m away from the desk.

The acceleration of gravity is 9.81 m/s^2 .

How fast was it rolling on the desk before it fell off? Answer in units of m/s.

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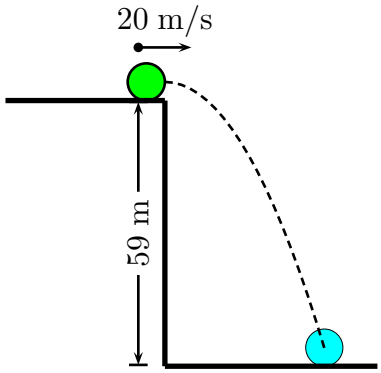
045 (part 1 of 2) 10 points

A person standing at the edge of a seaside cliff kicks a stone over the edge with a speed of 20 m/s. The cliff is 59 m above the water's surface, as shown.

The acceleration of gravity is 9.81 m/s^2 .



Note: Figure not drawn to scale

a) How long does it take for the stone to fall to the water? Answer in units of s.

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046 (part 2 of 2) 10 points

b) With what speed does the stone strike the water? Answer in units of m/s.

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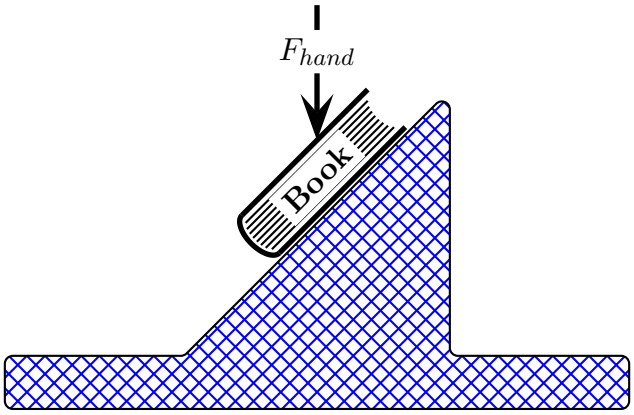
047 (part 1 of 2) 10 points

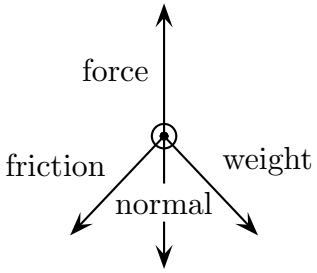
A book is at rest on an incline as shown below. A hand, in contact with the top of the book, produces a constant force F_{hand} vertically downward.



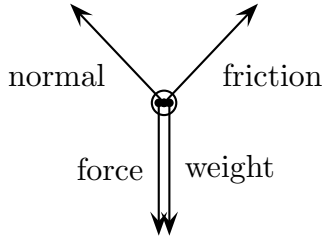
The following figures show several attempts at drawing free-body diagrams for the book.

Which figure has the correct directions for each force? The magnitudes of the forces are not necessarily drawn to scale.

1.



2.



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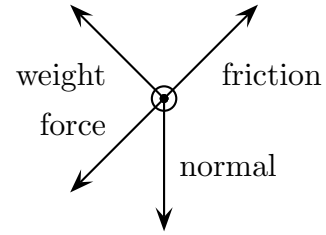

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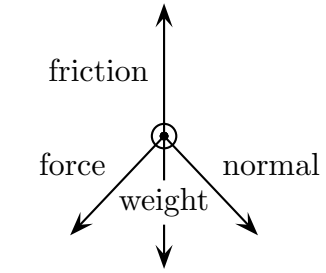

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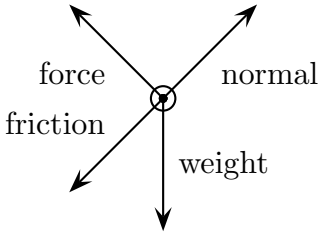

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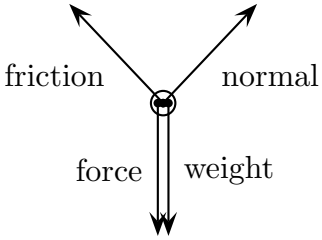

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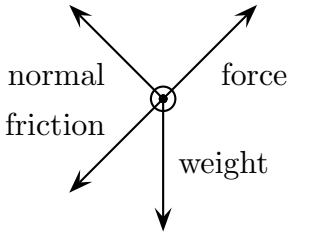
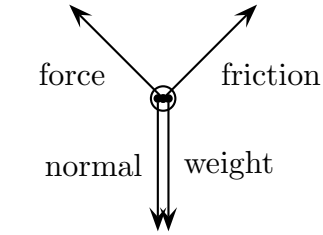


8.



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048 (part 2 of 2) 10 points

For the normal force exerted on the book by the wedge in the diagram, which force(s) complete(s) the force *pair* for Newton's third law (action-reaction)?

1. the component of gravity pointing perpendicular to the surface of the incline

2. the component of F_{hand} pointing perpendicular to the surface of the incline

3. the pull of the book on the earth

4. the pull of the earth on the book

5. the sum of the component of gravity perpendicular to the surface of the incline and the component of F_{hand} perpendicular to the surface of the incline

6. the component of gravity pointing parallel to the surface of the incline

7. the normal force exerted on the wedge by the book

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049 (part 1 of 1) 10 points
Newton's law of universal gravitation is

$$F = G\,\frac{M\,m}{r^2}\,.$$

Here, M and m are masses and r is the separation distance. The dimension of force is specified by the equation $F = ma$.

What are the SI units of the constant G?

1. $[G] = \mathrm{kg/m^2/s^2}$

2. $[G] = \mathrm{m^3/kg^2/s^2}$

3. $[G] = \mathrm{m^2/kg^2/s^2}$

4. $[G] = \mathrm{W/m^3}$

5. $[G] = \mathrm{N\,m/s^2}$

6. $[G] = \mathrm{N\,m}$

7. $[G] = \mathrm{m/kg/s^2}$

8. $[G] = \mathrm{m^3/kg/s^2}$

9. $[G] = \mathrm{J\,s/kg}$

10. $[G] = \mathrm{m^2/kg}$

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050 (part 1 of 1) 10 points
A ball rolls across the top of a billiard table and slowly comes to a stop.

How would Aristotle interpret this observation? How would Galileo interpret it?

1. All are wrong.

2. They both would say that it comes to rest because of some forces acting on it; likely friction between the ball and table surface and with the air.

3. Aristotle would say that the ball comes to rest because the ball seeks its natural state of rest. Galileo would likely have said it comes to rest because of some forces acting on it; likely friction between the ball and table surface and with the air.

4. They both would say that the ball comes to rest because the ball seeks its natural state of rest.

5. Galileo would say that the ball comes to rest because the ball seeks its natural state of rest. Aristotle would likely have said it comes to rest because of some forces acting on it; likely friction between the ball and table surface and with the air.

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051 (part 1 of 1) 10 points
Your friend says that inertia is a force that keeps things in their places, either at rest or motion.

Do you agree? Why or why not?

1. All are wrong.

2. Disagree; inertia is a property of matter to behave this way, not some kind of force.

3. Agree; only forces can keep things in their places.

4. Disagree; inertia is a force that keeps things moving.

5. Agree; inertia is not a force that keeps things moving.

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052 (part 1 of 1) 10 points
What is the net force on a 1-N apple when you hold it at rest above your head and what is the net force on it after you release it?

1. 1 N, 0 N

2. 0 N, 1 N

3. All are wrong.

4. 1 N, 1 N

5. 0 N, 0 N

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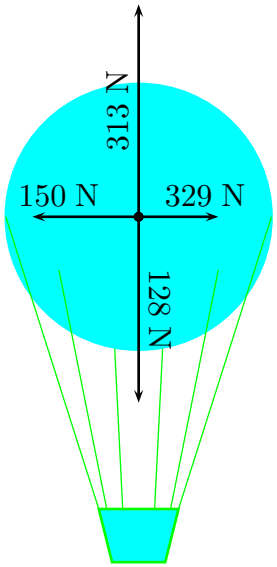
053 (part 1 of 2) 10 points
Four forces act on a hot-air balloon, as shown from the side.



Note: Figure is not drawn to scale
a) Find the magnitude of the resultant force on the balloon. Answer in units of N.

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054 (part 2 of 2) 10 points
b) Find the direction of the resultant force (in relation to the 329 N force, with up being positive). Answer in units of °.

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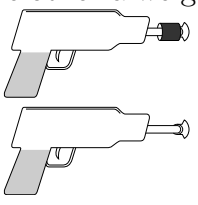
055 (part 1 of 1) 10 points
Two identical spring-loaded dart guns are simultaneously fired straight forward. One fires a regular dart; the other a weighted dart.



Which dart goes farther?

1. It's a tie.

2. The regular dart.

3. The weighted dart.

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056 (part 1 of 1) 10 points
A space probe is carried by a rocket into outer space where it continues to move on its own in a straight line.
What keeps the probe moving?

1. The gravitation forces from different stars and planets

2. Nothing; the probe will eventually stop.

3. Nothing specific; in the absence of forces it would continue moving in a straight line.

4. a propeller

5. None of these

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057 (part 1 of 1) 10 points
Each bone in the chain of bones forming your spine is separated from its neighbors by disks of elastic tissue.
What happens, then, when you jump heavily onto your feet from an elevated position?

1. The space between each disk will become larger because of Newton's first law.

2. The discs tend to compress upon each other because of Newton's first law.

3. All are wrong.

4. The discs tend to compress upon each other because of Newton's second law.

5. The space between each disk will become larger because of Newton's second law.

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058 (part 1 of 1) 10 points
If a mass of 1 kg is accelerated 1 m/s^2 by a force of 1 N, what would be the acceleration of a 58 kg mass acted on by a force of 58 N? Answer in units of m/s^2.

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059 (part 1 of 1) 10 points
What Aristotelian idea did Galileo discredit in his fabled Leaning Tower demonstration?

1. He discredited Aristotle's idea of gravitation.

2. He discredited Aristotle's idea that the rate at which bodies fall is inversely proportional to their weight.

3. All are wrong.

4. He discredited Aristotle's idea that the rate at which bodies fall is not related to their weight.

5. He discredited Aristotle's idea that the rate at which bodies fall is directly proportional to their weight.

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060 (part 1 of 1) 10 points
What force pushes up on you when you jump vertically off the ground?

1. All are wrong.

2. The force of gravitation

3. The ground pushes up on you.

4. The force of air drag

5. Your feet push up on your body.

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061 (part 1 of 1) 10 points
Identify the action-reaction pairs when a baseball is in flight.

1. Action: Bat pushes ball forward. Reaction: Ball pulls up on Earth. Action: Ball pushes air. Reaction: Air pushes ball.

2. Action: Ball pulls down on Earth. Reaction: Earth pulls up on ball. Action: Air pushes ball. Reaction: Ball pushes air.

3. All are wrong.

4. Action: Bat pushes ball backward. Reaction: Earth pulls down on ball. Action: Ball pushes air. Reaction: Air pushes ball.

5. Action: Earth pulls down on ball. Reaction: Ball pulls up on Earth. Action: Air pushes ball. Reaction: Ball pushes air.

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062 (part 1 of 1) 10 points
Identify the action-reaction pairs when a baseball is being hit.

1. Action: ball hits bat. Reaction: bat hits the player.

2. None of these

3. Action: bat hits ball. Reaction: ball hits bat.

4. Action: ball hits bat. Reaction: bat pushes the arm of the player.

5. Action: bat hits ball. Reaction: ball hits the player.

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063 (part 1 of 1) 10 points
If a Mack truck and Honda Civic have a head-on collision, upon which vehicle is the impact force greater and which vehicle experiences the greater acceleration?

1. The forces are the same; the accelerations are same.

2. All are wrong.

3. The forces are the same; the truck experiences the greater acceleration.

4. The force on the truck is greater; the accelerations are the same.

5. The forces are the same; the Civic experiences the greater acceleration.

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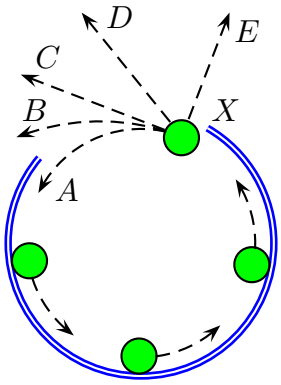
064 (part 1 of 1) 10 points

A ball rolls around a circular wall, as shown in the figure below. The wall ends at point X.



When the ball gets to X, which path does the ball follow?

1. Path C

2. Path A

3. Path E

4. Path B

5. Path D

6. B only

7. A only

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065 (part 1 of 1) 10 points

A communication satellite does not fall to the earth

A. only if it is in a geosynchronous orbit.
B. because the net force on it is zero.
C. because it is beyond the pull of the earth's gravity.
D. because it is in the earth's gravitational field.
E. because it is being pulled by the sun and by other planets as well as the earth.

1. E only

2. C only

3. None of these

4. D only

5. B and C