

4.1 Quizlette - Newton's Second Law (turn this in)

Name _____

F = ma:

1. What **net force** would accelerate a 2.50 kg mass at a rate of 27.6 m/s/s?

2. What **mass** accelerates at 6.50 m/s/s when a force of 87.0 N acts on it?

3. What is the **acceleration** of a 9.10 kg mass if there is a net force of 3.50 N acting on it?

(weight) $F_g = mg$: (Use $g = 9.80 \text{ N/kg}$ - round to three digits total)

4. What is the **weight** on earth of a 60.0 kg boy named Brennen?

5. What **mass** on earth weighs 730. N?

6. A 45.0 kg mass weighs 73.0 N on the moon. What is the "**g**" (The gravitational field strength) of the moon?

1) 69.0 N, 2) 13.4 kg, 3) 0.385 m/s/s, 4) 588 N, 5) 74.5 kg, 1.62 N/kg

Kinematics then $F = ma$:

7. What **net force** would accelerate a 6.80 kg mass from rest a distance of 24.0 m in 5.00 s?

8. A 72.0 kg mass accelerates from 5.70 m/s to 18.0 m/s in 4.00 s. What **net force** acted?

9. A 12.0 kg mass accelerates from 6.20 m/s to 15.0 m/s over a distance of 21.0 m. What **net force** acted?

7) 13.1 N, 8) 221 N, 9) 53.3 N, 10) 42.0 m/s, 11) 3.95 s, 12) 35.6 m

$F = ma$ then Kinematics:

10. A 24.0 N net force acts on a 8.00 kg mass. If it accelerates from rest, what is the **final velocity** in 14.0 s?

11. A net force of 26.0 N acts on a 3.80 kg mass. After what **time** would the mass reach a speed of 27.0 m/s from rest?

12. A net force of 36.0 N acts on a 8.50 kg mass. What will be its **displacement** from rest if it accelerates for 4.10 s?

Name _____ (Do this before the test, **grade it** and **correct it** on the website, turn it in before the test)

Show your work, round to about three total digits, circle your answers, and label them with units. Use the convention that up is positive.

1. What is the acceleration of a 4.39 kg mass if there is a net force of 12.5 N on it?

2. What is the mass of an object that weighs 764 N on earth?

3. What net force would accelerate a 2.10 kg mass at 7.80 m/s/s?

4. What net force would accelerate a 0.145 kg baseball from rest to 38.0 m/s in a distance of 0.985 m?

5. If there is a net force of 42.0 N on a 3.60 kg mass, what time would it cover 37.0 m from rest?

4.2 Quizlette - Vertical Acceleration (turn this in) Name _____

(use the convention that down is negative, $g = 9.8 \text{ m/s/s}$)

Unknown Acceleration:

1. A 3.20 kg rocket has engines that deliver 38.0 N of thrust. What is the acceleration of the rocket?

2. A small elevator has a mass of 12.0 kg, and is suspended by a cable that has a tension of 92.0 N. What is its acceleration?

Unknown force:

3. A 6.00 kg rocket accelerates upward at 32.0 m/s/s. What must be the thrust of the engines?

4. A 8.20 kg mass is on a cord and is accelerating downwards at 7.80 m/s/s. What is the tension in the cord?

1) 2.08 m/s/s (up), 2) -2.13 m/s/s (down), 3) 250.8 N, 4) 16.4 N

Kinematics then unknown force

5. A 4.30 kg mass on a cord is moving upwards, and stops in a distance of 6.20 m in 2.10 seconds. What is the tension in the cord as it is stopping?

6. A small 14.0 kg elevator is moving downward at 8.90 m/s, and is stopped in a distance of 7.40 m. What is the tension in the cable supporting the elevator as it is stopping?

5) 30.0 N, 6) 212 N, 7) 63.5 m up, 8) 2.49 m

Unknown Acceleration then Kinematics:

7. A 72.0 kg rocket has engines that generate a thrust of 1250 N. If it starts at rest, what is its elevation in 4.10 seconds?

8. A 62.0 kg climber is falling at 13.0 m/s, and is stopped by a force of 2710 N. In what distance will they stop?

4.3 Quizlette - Friction (turn this in)

Name _____

Basic Friction:

(1-4) A 6.80 kg block of wood has a static coefficient of 0.340 and a kinetic of 0.170 between it and a desk.

1. Calculate the maximum force of static friction
2. Calculate the force of kinetic friction
3. If the block is at rest, and I exert a force of 27.0 N to make it move, does it slide?
Why or why not? Explain your answer with numbers and words.
4. If the block is at rest, and I exert a force of 20.0 N to make it move, does it slide?
Why or why not? Explain your answer with numbers and words.

Unknown acceleration: (Label all accelerations either accel - speeding up, or decel - slowing down)

(5-8) A 5.00 kg box of chocolates has a coefficient of static friction of 0.360, and a kinetic of 0.140 between it and the table. (label all your accelerations accel - speeding up, or decel - slowing down)

5. If the box is sliding to the right and there is a force of 11.0 N to the right, what is the acceleration of the box?
6. If the box is sliding to the right, and there is a force of 5.00 N to the right, what is the acceleration of the box?
7. If the box is sliding to the left, and there is a force of 23.0 N to the left, what is the acceleration of the box?
8. If the box is sliding to the left, and there is a force of 4.00 N to the right, what is the acceleration of the box?

1) 22.7 N, 2) 11.3 N, 3) Yes it will slide, because 27.0 N is bigger than the maximum static force of 22.7 N, 4) No, applied force of 20.0 N is smaller than the maximum static friction of 22.7 N, 5) 0.828 m/s/s accel, 6) -0.372 m/s/s decel, 7) -3.23 m/s/s decel, 8) +2.17 m/s/s decel

Unknown force: (Use the convention that right is +, left is -)

(9-12) A 3.80 kg block of cheese has a coefficient of static friction of 0.830, and a kinetic of 0.250 between it and the table. (label all forces left or right)

9. What outside force would cause it to slide to the right, and accelerate to the right at 5.90 m/s/s?

10. What outside force would cause it to slide to the right and decelerate at 1.80 m/s/s?

11. What outside force would cause it to slide to the left and accelerate left at 2.70 m/s/s?

12. What outside force would make it slide to the left and decelerate at 5.00 m/s/s?

13. In the space below, draw a cartoon of Mr. Duggan and Mr. Osborn playing pin the tail on the Drumhiller while wearing ballerina outfits: (optional)

9) 31.7 N right, 10) 2.47 N right,
11) -19.6 N (left), 12) 9.69 N right

Physics
FA 4.3 - Friction

Name _____ (Do this before the test, **grade it** and **correct it** on the website, turn it in before the test)

Show your work, round to about three digits total, circle your answers, and label them with units.

Label every force **right** or **left**; Label every acceleration as either **accel** - speeding up or **decel** - slowing down

A 4.25 kg block of wood has a kinetic coefficient of friction of 0.120 and a static of 0.330 between it and the level floor.

0. Calculate the **kinetic friction force**, and the **maximum static friction force**. If the block were at rest, and you exerted a force to the right of 15.0 N, **would the block begin to move?** What if the force was 12.0 N? Support your answer with numbers.

1. If the block is sliding to the right, and I exert a force of 7.80 N to the right, what is the acceleration of the block?

2. If the block is sliding to the left, and I exert a force of 3.50 N to the right, what is the acceleration of the block?

3. If the block is sliding to the right, and accelerating to the right at 2.35 m/s/s, what must be the outside force acting on the block?

4. If the block is sliding to the left, but is decelerating at 3.12 m/s/s, what must be the outside force acting on the block?

Physics - Fall Mock Final

Name _____

Show your work, circle and label your answers with units.

Page 1 - Speed and Acceleration

1. A baseball is going 35.0 m/s. What distance does it travel in 0.522 s? (18.3 m)
2. A car goes 45 m in 8.00 s. What is its velocity? (5.63 m/s)
3. Convert 13.0 m/s to feet/second (42.7 f/s)
4. A car going 12.0 m/s accelerates at 1.20 m/s/s for 3.2 s. What is its final velocity? (15.8 m/s)
5. A car going 24.0 m/s is going 17.0 m/s 11.0 seconds later. What was its acceleration? (-0.636 m/s/s)

Page 2 - Linear Kinematics and Free Fall

1. A moving giant lizard stops in 3.10 m in 1.20 s. What was its acceleration? (-4.31 m/s/s)

2. A car is going 26.0 m/s after traveling 145 m in 7.80 s. What was its initial velocity? (11.2 m/s)

3. A runner accelerates uniformly from 1.30 m/s to 4.70 m/s with an acceleration of 5.20 m/s/s. What was their displacement? (1.96 m)

4-5. An air rocket leaves the ground going straight up with a velocity and reaches a height of 37.0 m before coming back down.

Neglect air friction and use $g = 9.8 \text{ m/s/s}$

4. What was its launch velocity? (26.9 m/s)

5. What total time was it in the air? (5.50 s)

Page 3 - Projectile Motion

Ignore air friction, use the convention that down is negative, and use $g = 9.8 \text{ m/s}^2$.

1-3: A ball is projected sideways from the top of a 12.0 m tall cliff. It lands having traveled a horizontal distance of 23.0 m.

1. What time is the ball in the air? (1.56 s)
2. What horizontal velocity did it have? (14.7 m/s)
3. Draw a picture of its velocity of impact and express it as an angle and a magnitude.
(21.2 m/s 46.2° below horiz.)

4-5: A ball is launched at 26.0 m/s at an angle of 65.0° above horizontal on a level field.

4. What time is it in the air? (4.81 s)
5. What horizontal distance does it travel before striking the ground again (52.8 m)

Page 4 - Dynamics

1. A 13.0 kg mass accelerates along a frictionless track covering 45.0 m of distance in 2.30 s from rest. What net force was acting on the mass? (221.2 N)

2-3: A 2.50 kg mass hangs on a cord.

Use the convention that up is positive.

2. If the tension in the cord is 12.0 N, what is the acceleration of the mass? (-5.00 m/s/s)

3. If the mass is accelerating downwards at 4.20 m/s/s, what is the tension in the cord? (14.0 N)

4-5: There is a coefficient of kinetic friction of 0.150 between a 8.00 kg block of wood and the level floor.

Use the convention that right is positive.

4. If there is a force of 9.20 N to the right, and the block is sliding to the right, what is the acceleration? Is it speeding up or slowing down? (Answer both questions) (-0.320 m/s/s, decelerating, or slowing down)

5. What in what direction force is needed to make it slide and accelerate to the right at 4.90 m/s/s? (Answer both questions) (51.0 N to the right)