



PHY 171

Exam 2

Fall 2018

Name:

Question 1

Courtney Force topped qualifying with a 3.826-second run at 150.2 m/s in the NHRA Arizona Nationals. What was her average acceleration?

- ☐ 39.26 m/s²
- ☐ 32.8 m/s²
- ☐ 36.95 m/s
- ☐ 39.3 m/s
- ☐ 28.33 m/s²

Question 2 A jogger runs down a straight road with an average velocity of 2.5 m/s for 6.00 minutes. What is her final position if her initial position was zero.

- ☐ 15 m
- ☐ 975 m
- ☐ 14.5 m
- ☐ 860 m
- ☐ 900 m

Question 3 Suppose the net external force exerted on a vacuum cleaner is 23 N parallel to floor. The mass of the vacuum cleaner is 15 kg. What is the acceleration?

- ☐ 1.5 m/s²
- ☐ 345 m/s²
- ☐ 1.53 m/s
- ☐ 0.652 m/s²
- ☐ 0.65 m/s

Question 4 Suppose a 130 kg wooden crate is resting on a wood floor. What is the maximum force you can exert horizontally on the crate without moving it? For wood on wood $\mu_s = 0.5$ and $\mu_k = 0.3$.

- ☐ 380 N
- ☐ 640 N
- ☐ 65 N
- ☐ 720 N
- ☐ 1300 N



Question 5 Calculate the magnitude of the centripetal acceleration of a car following a curve of radius 350m at a speed of 25 m/s.

- ☐ 1.8 m/s²
- ☐ 0.98 m/s²
- ☐ 0.071 m/s²
- ☐ 0.56 m/s²
- ☐ 0.14 m/s²

Question 6 A truck with 0.75 m radius tires travels at 48 m/s. What is the angular velocity of the rotating tires in radians per second?

- ☐ 58 rad/s
- ☐ 67 rad/s
- ☐ 36 rad/s
- ☐ 32 rad/s
- ☐ 64 rad/s

Question 7 What is the power output for a 54 kg woman who runs up a 4.5 m high flight of stairs in 3 s, starting from rest but having a final speed of 2.5 m/s

- ☐ 623 W
- ☐ 963 W
- ☐ 850 W
- ☐ 1870 W
- ☐ 2550 W

Question 8 A hydroelectric power facility converts gravitational potential energy of water behind a dam to electrical energy. What is the gravitational potential energy relative to the generators of a lake of volume 35 km³, (3.50×10^{13} kg) given that the lake has an average height of 25 m above the generators?

- ☐ 8.75×10^{14} J
- ☐ 8.31×10^{15} J
- ☐ 6.38×10^{13} J
- ☐ 8.57×10^{16} J
- ☐ 8.58×10^{15} J

Question 9 What is the momentum of a fire truck that is 1.25×10^4 kg and is moving at 35 m/s?

- ☐ 3.98×10^3 kg m/s
- ☐ 4.37×10^5 kg m/s
- ☐ 4.38×10^4 kg m/s
- ☐ 7.66×10^6 kg m/s
- ☐ 1.53×10^5 kg m/s



Question 10 Two children push in opposite sides of a door during play. Both push horizontally and perpendicular to the door. One child pushes with a force of 15.0 N at a distance of 0.30 m from the hinges, and the second child pushes at a distance of 0.20 m. What force must the second child exert to keep the door from moving? Assume friction is negligible.

- ☐ 21.2 N
- ☐ 16.4 N
- ☐ 25.3 N
- ☐ 22.5 N
- ☐ 10.0 N

Question 11 Train cars are coupled together by being bumped into one another. Suppose two loaded train cars are moving toward one another, the first having a mass of 112,000 kg and a velocity of 0.3 m/s, and a second having a mass of 132,000 kg and a velocity of -0.4 m/s. What is their final velocity?

- ☐ 0.786 m/s
- ☐ -0.0787 m/s
- ☐ 0.354 m/s
- ☐ -7.9 m/s
- ☐ -0.354 m/s

Question 12 A person carries a plank of wood 2 m long with one hand pushing down on it at one end with a force F_1 and the other hand holding it up at .35 m from the end of the plank with a force of F_2 . If the plank has a mass of 12 kg and its center of gravity is at the middle of the plank, what are the magnitudes of the forces F_1 and F_2 ? (Draw a box around your answer) ☐w ☐s ☐h ☐a ☐c



Question 13 You have a grindstone that is 95 kg, has a 0.35 m radius and is turning at 150 rpm, and you press a steel ax with a radial force of 25 N. Assuming the kinetic coefficient of friction between steel and stone is 0.2, calculate the angular acceleration of the grindstone. Note: $I = \frac{1}{2}mR^2$

(Draw a box around your answer)

☐ w ☐ s ☐ h ☐ a ☐ c

Question 14 Calculate the rotational kinetic energy in a motorcycle wheel if its angular velocity is 150 rad/s. Assume $m = 15$ kg, $R_1 = 0.30$ m and $R_2 = 0.35$ m. Note: $I = \frac{1}{2}m(R_1^2 + R_2^2)$

(Draw a box around your answer)

☐ w ☐ s ☐ h ☐ a ☐ c



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