

# Ch 3 Energy and Forces 2018

Name: \_\_\_\_\_



MC ans	
1	D
2	D
3	B
4	C
5	A
6	C
7	A
8	B
9	A
10	D

## Multiple Choice - 2 pts each

/20

1. Which example best illustrates the effect of gravitational force?

- A. A charged balloon that you stick to the wall.      B. The Earth's magnetic field.  
 C. Two magnets that attract each other      **D. The moon orbiting the earth.**

2. A machine with an energy efficiency of 73% provides 56 700 J of useful energy. What is the amount of energy this machine consumed?

- A. 777 J      B. 15 309 J      C. 41 391 J      **D. 77 671 J**

$$\frac{73}{100} = \frac{56700}{x}$$

3. An electric food mixer consumes 285 W of power and is used for 2 minutes. How much of this energy is used to rotate the whisks if its energy efficiency is 87%.

- A. 4 446 J      **B. 29 754 J**      C. 39 310 J      D. 263 077 J

$$E = P \times t = 285 \text{ W} \times 120 \text{ s} = 34200 \text{ J}$$

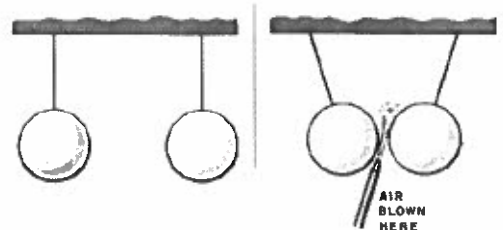
$$\frac{87}{100} = \frac{x}{34200} \quad x = 29754 \text{ J}$$

whisks →



4. Two spheres move together when air is blown between the two.

Bernoulli's Principle best explains this occurrence because:



- A. Since the air speed between the balloons is moving slower, the pressure is lower.  
 B. Since the air speed between the balloons is moving slower, the pressure is higher.  
**C. Since the air speed between the balloons is moving faster, the pressure is lower.**  
 D. Since the air speed between the balloons is moving faster, the pressure is higher.

5. What conditions must apply to the lift and weight of a plane so that it remains at the same altitude?

- A. The lift and weight must be equal and in the opposite direction.**  
 B. The lift and weight must be equal and in the same direction.  
 C. The lift must be greater than the weight and in the opposite direction.  
 D. The lift must be less than the weight and in the opposite direction.

6. The electromagnetic force is best described as :

- A. An attractive or repulsive force between protons and neutrons in a nucleus.
- B. An attractive or repulsive force between subatomic particles.
- C. An attractive or repulsive force between objects with electrical charge or magnetic poles.**
- D. A force that prevents two object from slipping past each other.

7. A 90 cm long conveyor belt placed between two work stations takes 3 seconds to carry a parcel from one work station to the other. What is the speed of the conveyor belt?

- A. 0.3 m/s**
- B. 2.7 m/s
- C. 30 m/s
- D. 270 m/s

$$90 \text{ cm} \div 100 = 0.9 \text{ m}$$

$$v = \frac{d}{t} = \frac{0.9 \text{ m}}{3 \text{ s}} = 0.3 \frac{\text{m}}{\text{s}}$$

8. How many minutes does it take to ride a scooter 20 km if you travel 10.1 m/s?

- A. 2 min
- B. 33 min**
- C. 202 min
- D. 1 980 min

$$20 \text{ 000 m}$$

$$t = \frac{d}{v} = \frac{20 \text{ 000 m}}{10.1 \text{ m/s}} = 1980 \text{ s}$$

$$\downarrow \div 60$$

$$33 \text{ min}$$

9. How far does a car travel after 48 min if its speed is 95 km/h?

- A. 76 km**
- B. 4 560 km
- C. 45.6 km
- D. 95 km

$$d = v t$$

$$= 95 \times 0.8 \text{ h}$$

$$= 76$$

10. In which situation will the amount of **thermal energy** in a substance **increase the most**?

- A. When we decrease the amount of the substance and decrease its temperature.
- B. When we decrease the amount of the substance and increase its temperature.
- C. When we increase the amount of the substance and decrease its temperature.
- D. When we increase the amount of the substance and increase its temperature.**

### Long Answer questions - please show all calculations!

(11)

11. If someone weights 108.55 N on the moon (moon's gravity is 1.62 N/kg). How much will they weigh on earth? (Earth's gravity is 9.8 N/kg) Show all your work. Round final answer to a whole # (2)

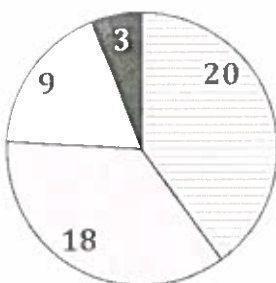


$$m = \frac{F}{g} = \frac{108.55}{1.62} = 67 \text{ kg}$$

$$F = mg = 67 \times 9.8 = 657 \text{ N}$$

12. Mr. Stringer's laptop claims to consume 50 Wh. This energy is used to **light up the screen and provide sound** when needed. Unfortunately a lot of this energy is **lost** as heat and vibration as shown in the pie chart below. Calculate the % efficiency of the laptop. (2)

Energy Consumption (in Wh)



- Heat Energy 20 Wh
- Luminous Energy 18 Wh
- Sound Energy 9 Wh
- Vibrational Energy 3 Wh

$$\% \text{ EE} = \frac{\text{useful}}{\text{consumed}} \times 100$$

$$= \frac{18+9}{50} \times 100$$

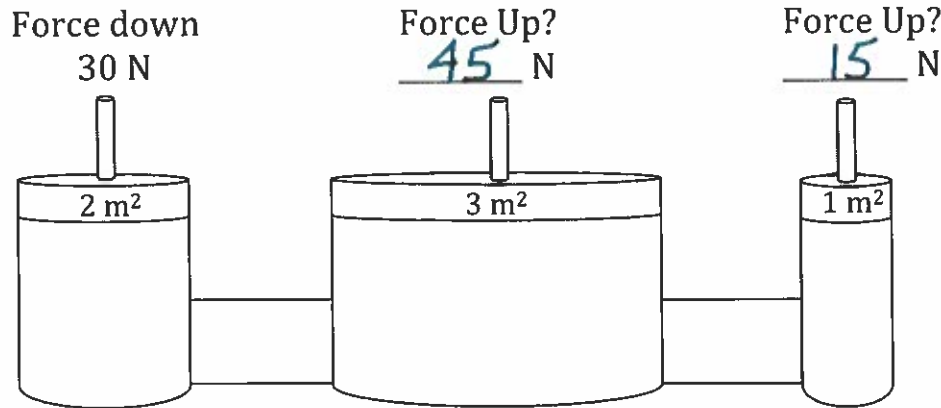
$$= \frac{27}{50} \times 100$$

$$= 54\%$$

13. Pascal's Principle states that pressure exerted anywhere in a confined incompressible fluid is transmitted equally in all directions throughout the fluid.

$$P = \frac{F}{A} \text{ where } P \text{ is pressure (in Pa), } F \text{ is force (in N) and } A \text{ is area (in m}^2\text{).}$$

Determine the resulting force in the diagrams below. This is a closed system and no fluid is lost. (3)  
 \*You do NOT need to show your work ☺



What is the pressure in this system? 15 Pa.

14. Black marbles and white marbles, of equal size, were stirred around in a bucket filled with water.

Shortly after the stirring stopped, some marbles sank to the bottom of the bucket, while others rose to the surface of the water, as shown in the diagram below.



Use Archimedes' principle to explain why the black marbles sink and the white marbles float. (2)

The black marbles weigh more so  $F_g > F_b$  and they sink  
The white marbles weigh less so  $F_g < F_b$  and they float  
Both marbles have the same buoyancy

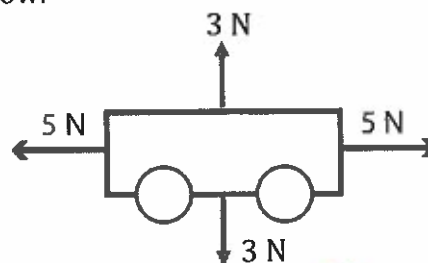
15. Determine the resultant force acting on the carts below. (2)

A.



A. Resultant force = 8 N

B.



B. Resultant force = 0



