

Name SOLUTIONS

Date _____

Newton's 2nd Law Practice

$$F = ma$$

- 1) How much net force would be needed to cause a 10 kg mass to accelerate at 3 m/s
- ²
- ?

$$m = 10 \text{ kg}$$

$$F = ma$$

$$a = 3 \text{ m/s}^2$$

$$F = (10)(3) = \boxed{30 \text{ N}}$$

$$F = ?$$

- 2) How much net force would be needed to cause a 15 kg mass to accelerate at 7 m/s
- ²
- ?

$$m = 15 \text{ kg}$$

$$F = ma$$

$$a = 7 \text{ m/s}^2$$

$$F = (15)(7) = \boxed{105 \text{ N}}$$

$$F = ?$$

- 3) A 100 kg mass accelerates at 10 m/s
- ²
- . What net force was used?

$$m = 100 \text{ kg}$$

$$F = ma$$

$$a = 10 \text{ m/s}^2$$

$$F = (100)(10) = \boxed{1000 \text{ N}} = \boxed{1 \times 10^3 \text{ N}}$$

$$F = ?$$

- 4) A 40 N net force is applied to a 5 kg object. What is its acceleration?

$$F = 40 \text{ N}$$

$$F = ma$$

$$m = 5 \text{ kg}$$

$$40 = 5a$$

$$a = ?$$

$$40/5 = a = \boxed{8 \text{ m/s}^2}$$

- 5) A 70 N net force is applied to a 20 kg object. What is its acceleration?

$$F = 70 \text{ N}$$

$$F = ma$$

$$m = 20 \text{ kg}$$

$$70 = 20a$$

$$a = ?$$

$$70/20 = a = \boxed{3.5 \text{ m/s}^2}$$

- 6) A 90 N net force is applied to a 2.5 kg object. What is its acceleration?

$$F = 90 \text{ N}$$

$$F = ma$$

$$m = 2.5 \text{ kg}$$

$$90 = 2.5a$$

$$a = ?$$

$$90/2.5 = a = \boxed{36 \text{ m/s}^2}$$

- 7) If a 50 N force causes an object to accelerate at 2 m/s
- ²
- , what is the object's mass?

$$F = 50 \text{ N}$$

$$F = ma$$

$$a = 2 \text{ m/s}^2$$

$$50 = m(2)$$

$$m = ?$$

$$50/2 = m = \boxed{25 \text{ kg}}$$

- 8) If a 75 N force causes an object to accelerate at 5 m/s
- ²
- , what is the object's mass?

$$F = 75 \text{ N}$$

$$F = ma$$

$$a = 5 \text{ m/s}^2$$

$$75 = m(5)$$

$$m = ?$$

$$75/5 = m = \boxed{15 \text{ kg}}$$

- 9) If a 10 N force causes an object to accelerate at 50 m/s
- ²
- , what is the object's mass?

$$F = 10 \text{ N}$$

$$F = ma$$

$$a = 50 \text{ m/s}^2$$

$$10 = m(50)$$

$$m = ?$$

$$\frac{10}{50} = \boxed{.2 \text{ kg}} = m$$

$$F = ma$$



- 10) A 100 N force is applied to an object and a 20 N force of friction works against it. If the object has a mass of 5 kg, what is its acceleration?

$$F = \text{NET FORCE} = \text{APPLIED} - \text{FRICTION}$$

$$F = 100 - 20 = 80\text{N}$$

$$F = 80\text{N}$$

$$m = 5\text{kg}$$

$$F = ma$$

$$80 = 5a$$

$$\frac{80}{5} = a = \boxed{16\text{m/s}^2}$$

- 11) A 300 N force is applied to an object and a 70 N force of friction works against it. If the object has a mass of 20 kg, what is its acceleration?

$$F = \text{NET FORCE} = \text{APPLIED} - \text{FRICTION}$$

$$F = 300 - 70 = 230\text{N}$$

$$F = 230\text{N}$$

$$m = 20\text{kg}$$

$$F = ma$$

$$230 = 20a$$

$$\frac{230}{20} = a = \boxed{11.5\text{m/s}^2}$$

- 12) An 80 N force is applied to an object and a 15 N force of friction works against it. If the object has a mass of 10 kg, what is its acceleration?

$$F = \text{APPLIED} - \text{FRICTION}$$

$$F = 80 - 15 = 65\text{N}$$

$$F = 65\text{N} \quad m = 10\text{kg}$$

$$F = ma$$

$$65 = 10a$$

$$\frac{65}{10} = a = \boxed{6.5\text{m/s}^2}$$

- 13) A 90 N force is applied to an object and a 30 N force of friction works against it. If the object accelerates at 5 m/s^2 , what is its mass?

$$F = \text{APPLIED} - \text{FRICTION}$$

$$F = 90 - 30 = 60\text{N}$$

$$F = 60\text{N}$$

$$a = 5\text{m/s}^2$$

$$F = ma$$

$$60 = m(5)$$

$$\frac{60}{5} = m = \boxed{12\text{kg}}$$

- 14) A 120 N force is applied to an object and a 40 N force of friction works against it. If the object accelerates at 15 m/s^2 , what is its mass?

$$F = \text{APPLIED} - \text{FRICTION}$$

$$F = 120 - 40 = 80\text{N}$$

$$F = 80\text{N}$$

$$a = 15\text{m/s}^2$$

$$F = ma$$

$$80 = m(15)$$

$$\frac{80}{15} = m = \boxed{5.3\text{kg}}$$

- 15) A 5 N force is applied to an object and a 2 N force of friction works against it. If the object accelerates at 0.02 m/s^2 , what is its mass?

$$F = \text{APPLIED} - \text{FRICTION}$$

$$F = 5 - 2 = 3\text{N}$$

$$a = 0.02\text{m/s}^2$$

$$F = ma$$

$$3 = m(0.02)$$

$$\frac{3}{0.02} = m = \boxed{150\text{kg}}$$

Answers: 1) 30 N 2) 105 N 3) 1000 N 4) 8 m/s^2 5) 3.5 m/s^2 6) 36 m/s^2 7) 25 kg 8) 15 kg
9) 0.2 kg 10) 16 m/s^2 11) 11.5 m/s^2 12) 6.5 m/s^2 13) 12 kg 14) 5.3 kg 15) 150 kg