Worksheet: Work   Name_____ *KEY* _____

1. Work is the product of the _____*force*_____ exerted on an object and the distance the object moves in the _____*direction*_____ of the force.
2. The equation for work is _____$W = F \times d$_____.
3. The unit for work is the _____*N·m*_____ which also called the _____*Joule*_____.
4. Work is done on an object only if the object _____*moves*_____.
5. Work is done on an object only if the force and displacement are
   _____*in the same direction*_____.

For each problem, draw a diagram to make sure the force and displacement are in the same direction.
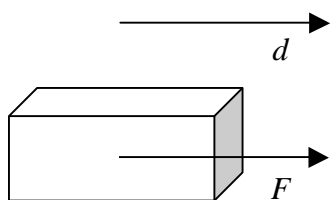
6. A person lifts a package weighing 75 N. If she lifts it 1.2 m off the floor, what work has she done?
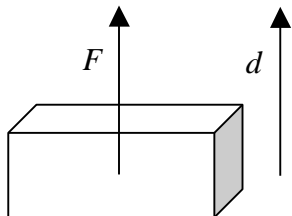
$$W = F \times d = (75 \ N)(1.2 \ m)$$
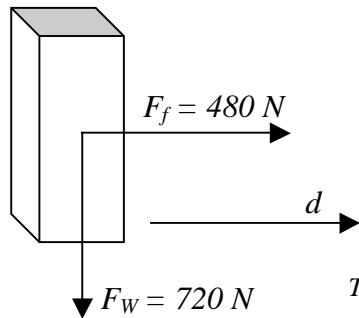$$= \boxed{9\overline{0} \ J}$$

7. When 142 J of work is done in pushing a box horizontally 13.3 m, how much force is applied?

$$W = F \times d \qquad F = \frac{W}{d}$$

$$F = \frac{142 \ J}{13.3 \ m} = \boxed{10.7 \ N}$$

8. What work is done when a person pushes a refrigerator weighing 720 N across a floor 12 m? (The force of friction between the refrigerator and the floor is 480 N.)
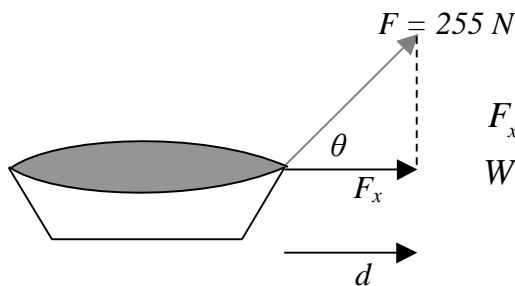
$W = F \times d = (480\ N)(12\ m)$

$= \boxed{5800\ J}$

$F_f = 480\ N$

d

$F_W = 720\ N$

The weight has no bearing on this problem because it is a force acting in a different direction than the motion.

9. A sailor pulls a boat along a dock using a rope at an angle of 60.0° with the horizontal. How much work does the sailor do if he exerts a force of 255 N on the rope and pulls the boat 3.00 m?
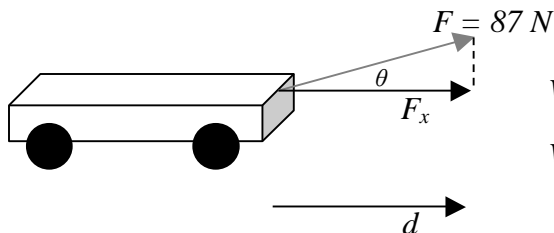
$F = 255\ N$

θ

F_x

d

$F_x = F \cos \theta = (255\ N)(\cos 60°) = 127.5\ N$

$W = F_x \times d = (127.5\ N)(3.00\ m)$

$= \boxed{382\ J}$

10. A girl pulls a wagon along a level path for a distance of 44 m. The handle of the wagon makes an angle of 22° above horizontal. If she pulls on the handle with a force of 87 N, how much work is done?

$F = 87\ N$

θ

F_x

d

$W = F_x \times d = (F \times \cos \theta) \times d = (87\ N)(\cos 22°)(44\ m)$

$W = \boxed{3500\ J}$

If students calculate F_x and use rounded answer, they will get a final answer of 3600J. It is best to combine equations and calculate only once.