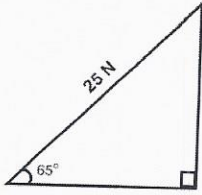


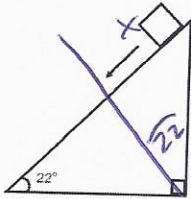
Effective force worksheet

1. A person is pulling a box along the floor with a force of 25 N at an angle of 65° to the horizontal. What is the effective force?



$$\cos 65 = \frac{x}{25} = \textcircled{11\text{N}}$$

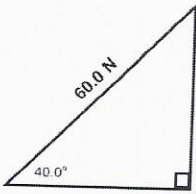
2. What is the magnitude of the effective force of a box weighing 33 kg sliding down an inclined plane at a 22° angle?



$$33 \times 9.8 = 323.4 = 320\text{ N}$$

$$\sin 22^\circ = \frac{x}{320} = 119.8 = \textcircled{120\text{N}}$$

3. a- A person is pulling a bag along the floor with a force of 60.0 N at an angle of 40.0° to the horizontal. What is the effective force?



$$\cos 40.0 = \frac{x}{60.0} = \textcircled{46.0\text{N}}$$

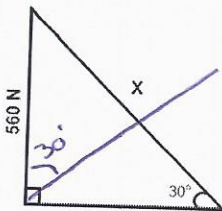
- b- If the bag weighs 7.0 kg, will the perpendicular force be strong enough to lift the bag off the ground?

$$7.0 \times 9.8 = 69\text{ N}$$

$$\sin 40.0 = \frac{x}{60.0} = 38.6\text{ N}$$

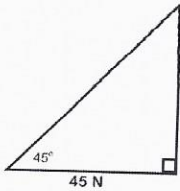
No can not lift, force too weak

4. Bob is skiing down a hill, his weight is 560 N and the slope of the ski run is 30.0° . What is the magnitude of the effective force responsible for Bob's descent?



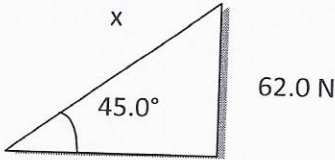
$$\sin 30.0 = \frac{x}{560} = \textcircled{280\text{N}}$$

5. What is the force used by a man pulling a cart with an effective force of 45 N at a 45° angle?



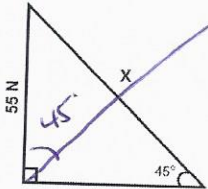
$$\cos 45 = \frac{45}{x} = 64\text{N}$$

6. What is the force used by a man lifting a cart with an effective force of 62.0 N at a 45.0° angle?



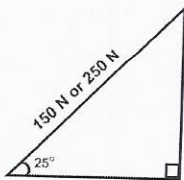
$$\sin 45.0 = \frac{62.0}{x} = 87.7\text{N}$$

7. What is the effective force if a marble weighing 55 N slides down an inclined plane with a 45° angle?



$$\sin 45 = \frac{x}{55} = 39\text{N}$$

8. Explain if each person will be able to lift their luggage weighing 35 kg off the floor if they both are pulling the luggage at a 25°, but person 1 is using 150 N of force and person 2 is using 250 N of force. $35 \times 9.8 = 340\text{N}$

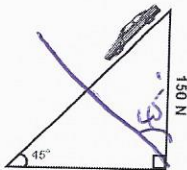


$$\sin 25 = \frac{x}{150} = 63\text{N}$$

$$\sin 25 = \frac{x}{250} = 110\text{N}$$

Neither has enough force to lift bag

9. a- A toy car is placed on a ramp tilted at a 45° angle. If the weight of the car was 150 N, what is the magnitude of the effective force that makes the car slide down the ramp?



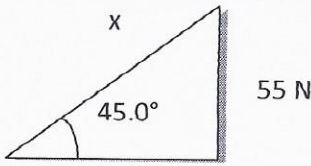
$$\sin 45 = \frac{x}{150} = \cancel{850\text{N}}$$

110N

- b- How would the magnitude of the force change if the angle was 75°?

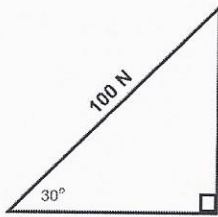
$$\sin 75 = \frac{x}{150} = 140\text{N}$$

10. What is the force used by a man lifting a cart with an effective force of 55 N at a 45.0° angle?



$$\sin 45.0 = \frac{55}{x} = \textcircled{78\text{N}}$$

11. a- A person is pulling a sled along the snow with a force of 100 N at a 30° angle. What is the effective force?



$$\cos 30^\circ = \frac{x}{100} = \textcircled{90\text{N}}$$

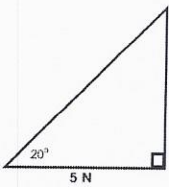
b- If the sled weighs 2 kg, will the perpendicular force be strong enough to lift the sled off the ground?

$$2 \times 9.8 = \textcircled{20\text{N}}$$

$$\sin 30 = \frac{x}{100} = 50\text{N}$$

yes, can lift has greater force than bag.

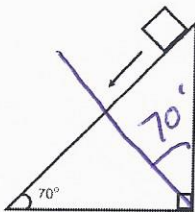
12. What is the force used by a woman pulling the garbage if the effective force was 5 N and the angle was 20°?



$$\cos 20 = \frac{5}{x} = \textcircled{5\text{N}}$$

13. What is the magnitude of the effective force of a box weighing 50.0 kg sliding down an inclined plane at an angle of 70.0°?

$$50.0 \times 9.8 = 490\text{N}$$



$$\sin 70.0 = \frac{x}{490} = \textcircled{460\text{N}} \text{ or } 4.60 \times 10^2\text{N}$$

14. Carol is snowboarding down a hill, her weight is 460 N and the slope of the ski run is 50°. What is the magnitude of the effective force responsible for Carol's descent?

$$\sin 50^\circ = \frac{x}{460} = \textcircled{400\text{N}}$$

15. Explain if each person will be able to lift a bag of softballs weighing 10.0 kg off the floor if they both are pulling the bag at a 45°, but person 1 is using 150 N of force and person 2 is using 50.0 N of force.

$$10.0 \times 9.8$$

$$\textcircled{98.0\text{N}}$$

$$\sin 45 = \frac{x}{150} = \textcircled{110\text{N}}$$

yes enough force

$$\sin 45 = \frac{x}{50} = \textcircled{35\text{N}}$$

No, too little force

16. a- A person is dragging her dog on the street for a walk with a force of 120 N at a 45° angle. What is the effective force?

$$\cos 45 = \frac{x}{120} = \textcircled{85\text{N}}$$

- b- If the dog weighs 2 kg, will the perpendicular force be strong enough to lift the dog off the ground? $2 \times 9.8 = 20\text{N}$

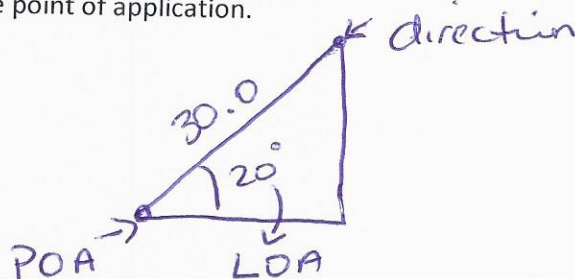
$$\sin 45 = \frac{x}{120} = \textcircled{85\text{N}}$$

yes can, has enough force

17. What is the force used by a woman pulling her child on a sled if the effective force was 45 N and the angle was 25°?

$$\cos 25 = \frac{45}{x} = \textcircled{50\text{N or } 5.0 \times 10^1\text{N}}$$

18. Draw a diagram showing a force of 30.0 N at an angle of 20.0° to the horizontal. Indicate the following four elements: the line of action, the direction of application, the magnitude of the force and the point of application.

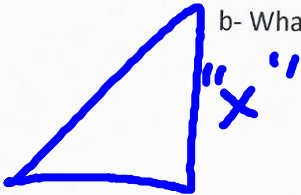


19. A child is playing with a car that weighs 15 N on a plane inclined at an angle of 20.0°. What is the gravitational force makes the car slide down the inclined plan.

$$\sin 20.0 = \frac{x}{15} = \textcircled{5.1\text{N}}$$

20. a- A child is pulling a rope tied to a cart with a force of 30.0 N and at an angle of 25°. What is the effective force?

$$\cos 25 = \frac{x}{30.0} = \textcircled{27\text{N}}$$



b- What is the component perpendicular to the distance travelled?

$$\sin 25 = \frac{x}{30.0} = \textcircled{13\text{N}}$$

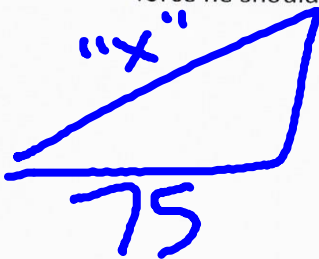
21. A cart weighing 20 N is on an inclined plane of 40°. What is the gravitational force component that makes the cart roll down the slope?

$$\sin 40 = \frac{x}{20} = \textcircled{10\text{N}}$$

22. What is the effective force in each of the following situations?

<p>a) The box slides down the inclined plane.</p>	$20 \times 9.8 = 200\text{N}$ $\sin 25 = \frac{x}{200} = \textcircled{80\text{N}}$
<p>b) The box slides along the ground.</p>	$\cos 20 = \frac{x}{30} = \textcircled{30\text{N}}$

23. The effective force of a man pulling a cart is 75 N. The handle is at a 25° angle. If the maximum force he should apply is 50.0 N, is he using too much force?



$$\cos 25 = \frac{75}{x} = 83\text{N}$$

Yes too much force.