شكراً لتحميلك هذا الملف من موقع المناهج الإماراتية

تجميعة الصفحات المهمة الأسئلة الاختيارية وفق الهيكل الوزاري انسباير باللغة الانجليزية

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التواصل الاجتماعي بحسب الصف التاسع المتقدم

روابط مواد الصف التاسع المتقدم على تلغرام

التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة فيزياء في الفصل الثاني

1	نموذج الهيكل الوزاري انسباير المسار المتقدم
2	ملخص ومراجعة درس Friction الاحتكاك
3	ملخص ومراجعة درس Vectors الأشعة
4	ملخص ومراجعة الدرس الثالث Law Third s'Newton قانون نيوتن الثالث

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5	ملخص ومراجعة الدرس الثاني Force Drag and Weight الوزن وقوة السحب

تجميع هيكل فزكس

عمل الطالب : حمد خالد العبدولي A2-9
مدرسه خليفه بن زايد للتعليم الثانوي .

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تعليم

Explain the motion of horizontally launched projectiles, and show schematically the components of velocity and acceleration throughout the motion.

Check Your Progress

7. **Initial Velocity** Two baseballs are pitched horizontally from the same height but at different speeds. The faster ball crosses home plate within the strike zone, but the slower ball is below the batter's knees. Why do the balls pass the batter at different heights?

8. **Free-Body Diagram** An ice cube slides without friction across a table at a constant velocity. It slides off the table and lands on the floor. Draw free-body and motion diagrams of the ice cube at two points on the table and at two points in the air.

تعليم

Define the friction force as a type of force between two touching surfaces, and determine its direction.

Kinetic and Static Friction

You push a book across your desk. When you stop pushing, the book stops due to friction.

Types of friction When you pushed your book across the desk, the book experienced a type of friction that acts on moving objects—**kinetic friction** is exerted on one surface by another when the two surfaces rub against each other because one or both surfaces are moving.

Now imagine trying to push a couch across the floor, as shown on the left in **Figure 10.** You push on it with a small force, but it does not move. Newton's laws tell you that the net force on the couch must be zero. There must be a second horizontal force acting on the couch that opposes your force and is equal in size. This force is **static friction,** which is the force exerted on one surface by another when there is no motion between the two surfaces.

You push harder, and the couch still does not move. The static friction force is increasing in response to your applied force. When you push hard enough, the couch begins to move as in the right side of **Figure 10.** There is a limit to how large the static friction force can be. Once your force is greater than this maximum static friction, the couch moves and kinetic friction acts on it.

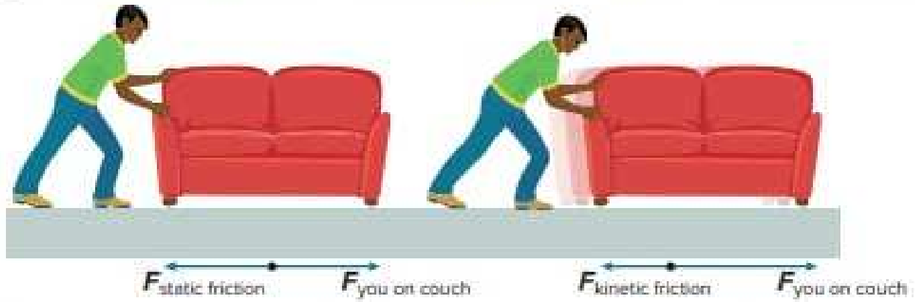


Figure 10 An applied force is balanced by static friction up to a maximum limit. When this limit is exceeded, the object begins to move.

Identify *the type of friction force acting on the couch when it begins to move.*

تعليم

1.Recall that for an object to be in equilibrium, the net force acting on it should be zero.

Equilibrium Revisited

So far, you have considered motion along a horizontal surface. Now you will analyze situations in which the forces acting on an object are at angles other than 90°.

When the net force on an object is zero, the object is in equilibrium. According to Newton's laws, the object will not accelerate because there is no net force acting on it; an object in equilibrium moves with constant velocity. (Remember that staying at rest is a state of constant velocity.) Equilibrium can also occur if more than two forces act on an object. As long as the net force on the object is zero, the object is in equilibrium.

What is the net force acting on the ring in **Figure 14?** The free-body diagram in the figure shows the three forces acting on the ring. The ring is not accelerating, so the net force is zero. The free-body diagram, however, does not immediately indicate that the net force is zero. To find the net force, you must add all the vectors together. **Figure 15** on the next page shows the process of adding the force vectors to discover the net force.

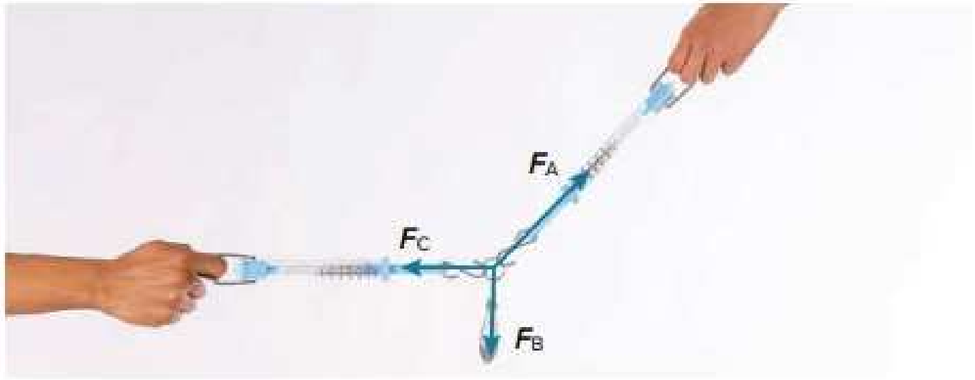


Figure 14 The ring does not accelerate, so the net force acting on it must be zero.

Compare *the vertical component of the force pulling up and to the right to the weight of the mass hanging from the ring.*

Solve problems related to friction

19. You want to move a 41-kg bookcase to a different place in the living room. If you push with a force of 65 N and the bookcase accelerates at 0.12 m/s^2, what is the coefficient of kinetic friction between the bookcase and the carpet?

20. Consider the force pushing the box in Example Problem 4. How long would it take for the velocity of the box to double to 2.0 m/s?

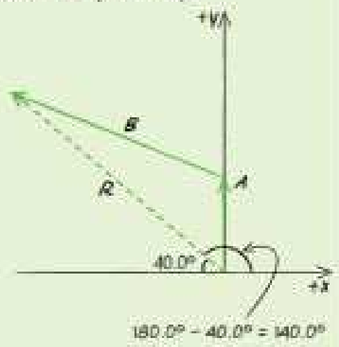
Determine the components of a vector in cartesian coordinate system using trigonometry

EXAMPLE Problem 2

FINDING YOUR WAY HOME You are on a hike. Your camp is 15.0 km away, in the direction 40.0° north of west. The only path through the woods leads directly north. If you follow the path 5.0 km before it opens into a field, how far, and in what direction, would you have to walk to reach your camp?

1 ANALYZE AND SKETCH THE PROBLEM

- Draw the resultant vector, ***R***, from your original location to your camp.
- Draw ***A***, the known vector, and draw ***B***, the unknown vector.



Known
$\boldsymbol{A} = 5.0$ km, due north
$\boldsymbol{R} = 15.0$ km, 40.0° north of west
$\theta = 140.0°$

Unknown
$\boldsymbol{B} = ?$

2 SOLVE FOR THE UNKNOWN

Find the components of ***R***.

$$R_x = R\cos\theta$$
$$= (15.0\text{ km})\cos 140.0° \qquad \text{Substitute } R = 15.0\text{ km}, \theta = 140.0°.$$
$$= 11.5\text{ km}$$

$$R_y = R\sin\theta$$
$$= (15.0\text{ km})\sin 140.0° \qquad \text{Substitute } R = 15.0\text{ km}, \theta = 140.0°.$$
$$= 9.64\text{ km}$$

Because ***A*** is due north, $A_x = 0.0$ km and $A_y = 5.0$ km.
Use the components of ***R*** and ***A*** to find the components of ***B***.

$$B_x = R_x - A_x$$
$$= -11.5\text{ km} - 0.0\text{ km} \qquad \text{Substitute } R_x = -11.5\text{ km}, A_x = 0.0\text{ km}.$$
$$= -11.5\text{ km} \qquad \text{The negative sign means that this component points west.}$$

$$B_y = R_y - A_y$$
$$= 9.64\text{ km} - 5.0\text{ km} \qquad \text{Substitute } R_y = 9.64\text{ km}, A_y = 5.0\text{ km}.$$
$$= 4.6\text{ km} \qquad \text{This component points north.}$$

Use the components of vector ***B*** to find the magnitude of vector ***B***.

$$B = \sqrt{B_x^2 + B_y^2}$$
$$= \sqrt{(-11.5\text{ km})^2 + (4.6\text{ km})^2} \qquad \text{Substitute } B_x = -11.5\text{ km}, B_y = 4.6\text{ km}.$$
$$= 12.4\text{ km}$$

Locate the tail of vector ***B*** at the origin of a coordinate system, and draw the components B_x and B_y. The vector ***B*** is in the second quadrant. Use the tangent to find the direction of vector ***B***.

$$\theta = \tan^{-1}\left(\frac{B_y}{B_x}\right)$$
$$\theta = \tan^{-1}\left(\frac{4.6\text{ km}}{-11.5\text{ km}}\right) \qquad \text{Substitute } B_x = 4.6\text{ km}, B_y = -11.5\text{ km}.$$
$$= -22° \text{ or } 158° \qquad \text{The tangent of an angle is negative in quadrants II and IV, so two answers are possible.}$$

Since ***B*** is in the second quadrant, θ, measured from the positive x-axis, must be 158°. This direction can also be given as 22° north of west. Thus, $\boldsymbol{B} = 12.4$ km at 22° north of west.

تعليم

Use free body diagrams to compare the direction of an object's acceleration with the direction of the unbalanced force exerted on the object

1. A skydiver falls downward through the air at constant velocity. (The air exerts an upward force on the person.)
2. You hold a softball in the palm of your hand and toss it up. Draw the diagrams while the ball is still touching your hand.
3. After the softball leaves your hand, it rises, slowing down.
4. After the softball reaches its maximum height, it falls down, speeding up.
5. **CHALLENGE** You catch the ball in your hand and bring it to rest.

Combine forces to find the net force acting on an object

Relate the direction of the acceleration to the direction of the net force

34. **Interaction Pair** Identify each force acting on the ball and its interaction pair in **Figure 20.**

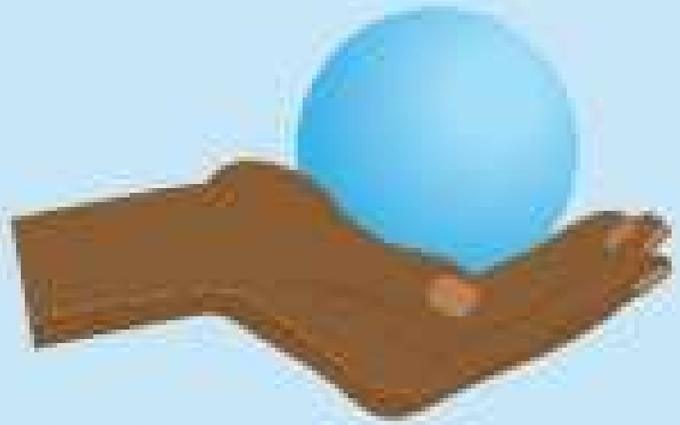


Figure 20

36. **Tension** A block hangs from the ceiling by a massless rope. A second block is attached to the first block and hangs below it on another piece of massless rope. If each of the two blocks has a mass of 5.0 kg, what is the tension in the rope?

37. **Tension** A block hangs from the ceiling by a massless rope. A 3.0-kg block is attached to the first block and hangs below it on another piece of massless rope. The tension in the top rope is 63.0 N. Find the tension in the bottom rope and the mass of the top block.

Relate the direction of the acceleration to the direction of the net force

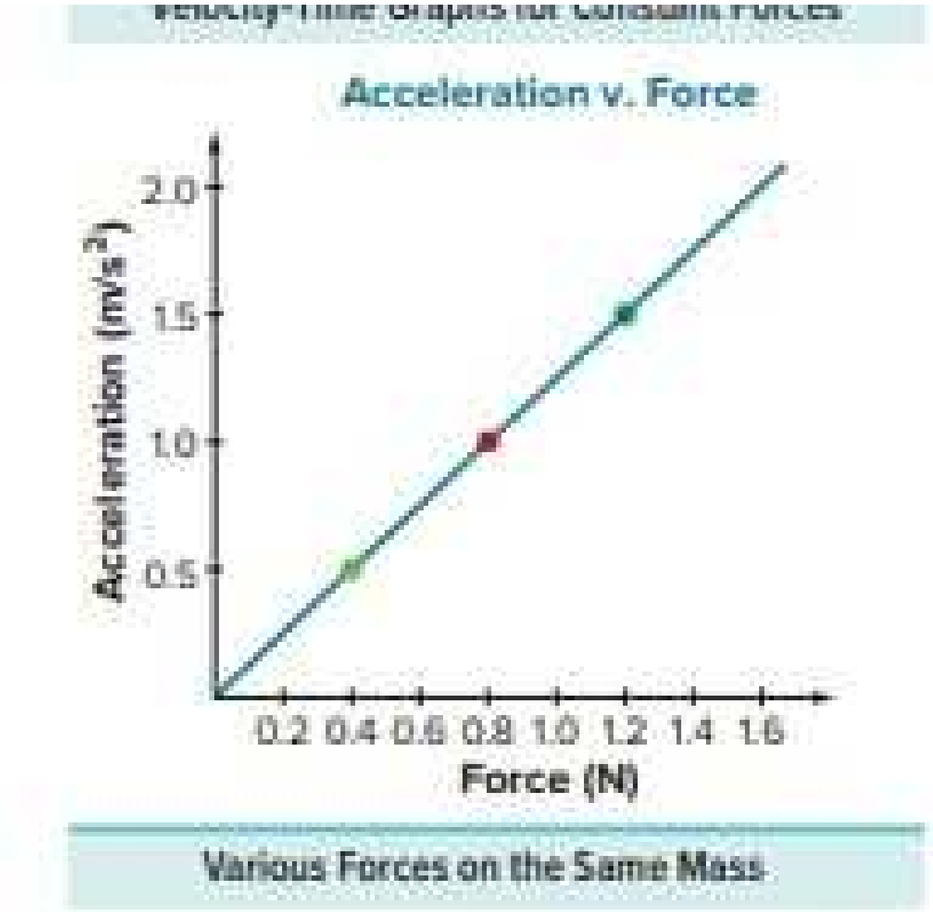


Figure 5 A spring scale exerts a constant unbalanced force on the cart. Repeating the investigation with different forces produces velocity-time graphs with different slopes.

Resolve a vector into two orthogonal vectors in cartesian coordinate system.

Check Your Progress

11. **Vectors** Use **Figure 9** for these questions.
    a. Find the components of vectors ***K***, ***L***, and ***M***.
    b. Find the sum of the three vectors.
    c. Subtract vector ***K*** from vector ***L***.

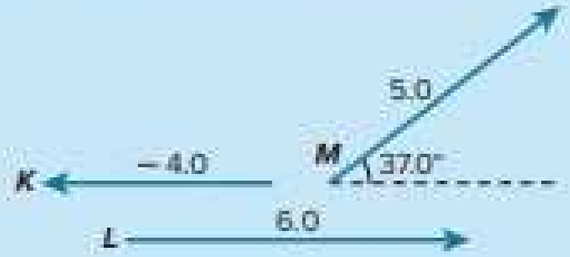


Figure 9

12. **Distance v. Displacement** Are distance and displacement always the same? Give an example that supports your conclusion.

13. **Commutative Operations** Vector addition is commutative because the order in which vectors are added does not matter.
    a. Use the vectors from **Figure 9** to show graphically that $M + L = L + M$.
    b. Are addition, subtraction, multiplication, and division commutative? Give an example of each operation to support your conclusion.

14. **Critical Thinking** You move a box through two unequal displacements. Could the displacements have directions such that the resultant displacement is zero? Suppose you now move the box through three displacements of unequal magnitude. Could the resultant displacement be zero? Support your conclusion with a diagram.

Relate graphically the frictional force to the normal force and find the coefficient of kinetic Friction.

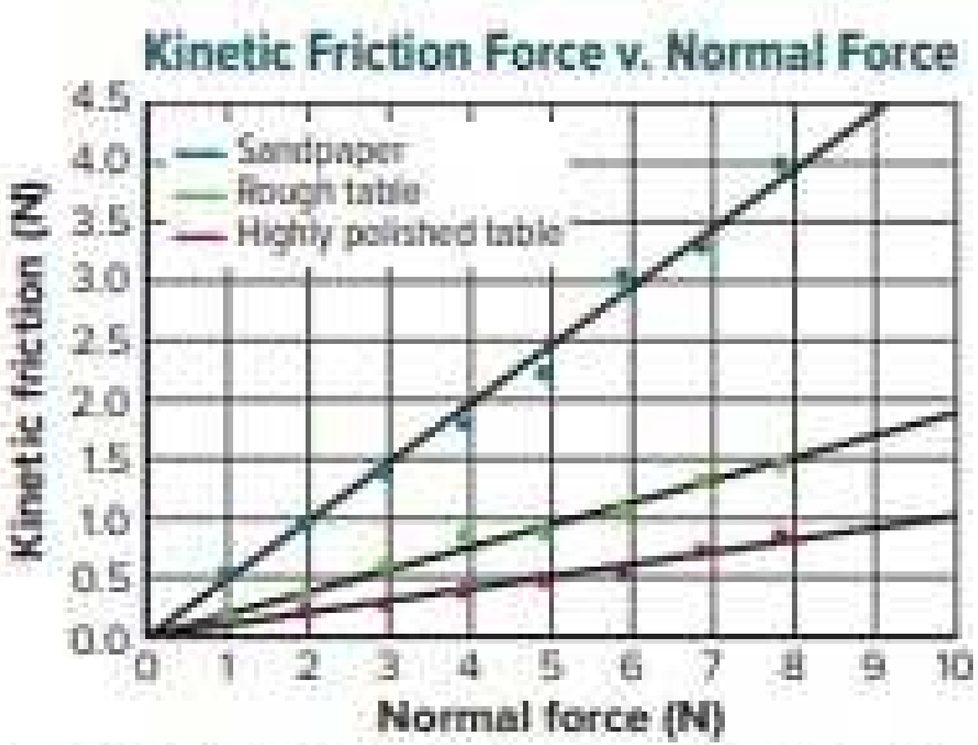


Figure 12 A plot of kinetic friction v. normal force for a block pulled along different surfaces shows a linear relationship between the two forces for each surface. The slope of the line is μ_k.

Compare *the coefficient of kinetic friction for the three surfaces shown on the graph.*

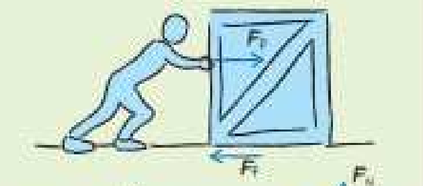
Apply the relationships that relate the normal force to maximum static friction and to kinetic friction to calculate unknown parameters like friction force, coefficient of friction or the normal force (Ff,static= μsN and Ff,kinetic= μkN).

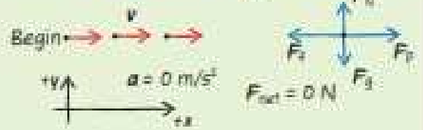
EXAMPLE Problem 3

BALANCED FRICTION FORCES You push a 25.0-kg wooden box across a wooden floor at a constant speed of 1.0 m/s. The coefficient of kinetic friction is 0.20. How large is the force that you exert on the box?

1 ANALYZE AND SKETCH THE PROBLEM

- Identify the forces, and establish a coordinate system.
- Draw a motion diagram indicating constant v and $a = 0$.
- Draw the free-body diagram.





Known	Unknown
$m = 25.0$ kg $\quad v = 1.0$ m/s	$F_{\text{person on box}} = ?$
$a = 0.0$ m/s² $\quad \mu_s = 0.20$	

2 SOLVE FOR THE UNKNOWN

The normal force is in the y-direction, and the box does not accelerate in that direction.

$$F_N = -F_g$$
$$= -mg \qquad \text{Substitute } F_g = -mg$$
$$= -(25.0 \text{ kg})(-9.8 \text{ N/kg}) \qquad \text{Substitute } m = 25.0 \text{ kg}, g = -9.8 \text{ N/kg}$$
$$= +245 \text{ N}$$

The pushing force is in the x-direction; v is constant; thus the box does not accelerate.

$$F_{\text{person on box}} = \mu_s F_N$$
$$= (0.20)(245 \text{ N}) \qquad \text{Substitute } \mu_s = 0.20, F_N = 245 \text{ N}$$
$$= 49 \text{ N}$$

$F_{\text{person on box}} = 49$ N, to the right

3 EVALUATE THE ANSWER

- **Are the units correct?** Force is measured in newtons.
- **Do the signs make sense?** The positive sign agrees with the sketch.
- **Is the magnitude realistic?** The pushing force is $\frac{1}{5}$ the weight of the box. This corresponds with $\mu_s = 0.20 = \frac{1}{5}$.

15. Gwen exerts a 36-N horizontal force as she pulls a 52-N sled across a cement sidewalk at constant speed. What is the coefficient of kinetic friction between the sidewalk and the metal sled runners? Ignore air resistance.

16. Mr. Ames is dragging a box full of books from his office to his car. The box and books together have a combined weight of 134 N. If the coefficient of static friction between the pavement and the box is 0.55, how hard must Mr. Ames push horizontally on the box in order to start it moving?

تعليم

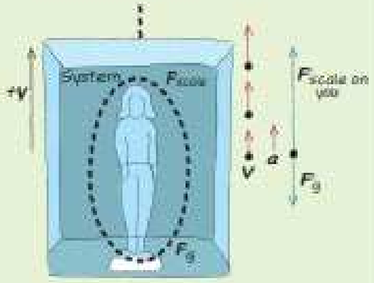
Describe the apparent weight for an object accelerating vertically upward or downward (starts from rest, reaches a constant speed, then comes to a stop)

EXAMPLE Problem 3

REAL AND APPARENT WEIGHT Your mass is 75.0 kg, and you are standing on a bathroom scale in an elevator. Starting from rest, the elevator accelerates upward at 2.00 m/s² for 2.00 s and then continues at a constant speed. Is the scale reading during acceleration greater than, equal to, or less than the scale reading when the elevator is at rest?

1 ANALYZE AND SKETCH THE PROBLEM

- Sketch the situation.
- Choose a coordinate system with the positive direction as upward.
- Draw the motion diagram. Label v and a.
- Draw the free-body diagram. The net force is in the same direction as the acceleration, so the upward force is greater than the downward force.



KNOWN	UNKNOWN
$m = 75.0$ kg	$F_{scale} = ?$
$a = 2.00$ m/s²	
$t = 2.00$ s	
$g = 9.8$ N/kg	

2 SOLVE FOR THE UNKNOWN

$F_{net} = ma$

$F_{net} = F_{scale} + (-F_g)$ F_g is negative because it is in the negative direction defined by the coordinate system.

Solve for F_{scale}:

$F_{scale} = F_{net} + F_g$

Elevator at rest:

$F_{scale} = F_{net} + F_g$ The elevator is not accelerating. Thus, $F_{net} = 0.00$ N.

$= F_g$ Substitute $F_{net} = 0.00$ N.

$= mg$ Substitute $F_g = mg$.

$= (75.0\ \text{kg})(9.8\ \text{N/kg})$ Substitute $m = 75.0$ kg, $g = 9.8$ N/kg.

$= 735$ N

Elevator accelerating upward:

$F_{scale} = F_{net} + F_g$

$= ma + mg$ Substitute $F_{net} = ma$, $F_g = mg$.

$= (75.0\ \text{kg})(2.00\ \text{m/s}^2) + (75.0\ \text{kg})(9.8\ \text{N/kg})$ Substitute $m = 75.0$ kg, $a = 2.00$ m/s², $g = 9.8$ N/kg.

$= 885$ N

The scale reading when the elevator is accelerating (885 N) is larger than when it is at rest (735 N).

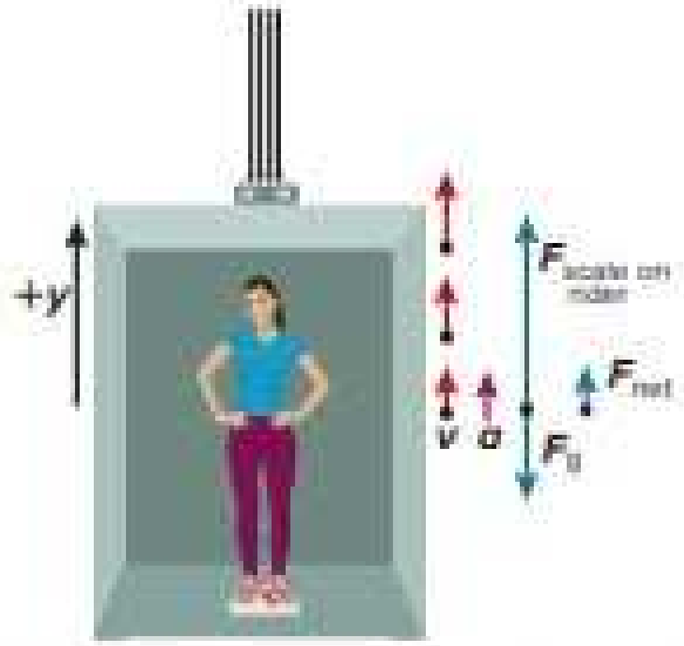
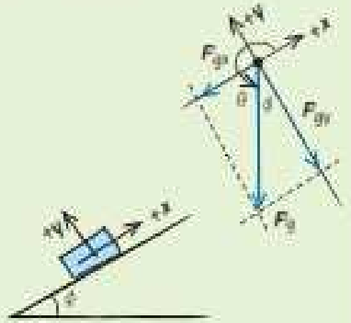


Figure 11 If you are accelerating upward, the net force acting on you must be upward. The scale must exert an upward force greater than the downward force of your weight.

Apply Newton's Laws along x and y axes for an object that moves on an inclined plane with and without friction.

EXAMPLE Problem 5

COMPONENTS OF WEIGHT FOR AN OBJECT ON AN INCLINE A 562-N crate is resting on a plane inclined 30.0° above the horizontal. Find the components of the crate's weight that are parallel and perpendicular to the plane.



1 ANALYZE AND SKETCH THE PROBLEM

- Include a coordinate system with the positive *x*-axis pointing uphill.
- Draw the free-body diagram showing F_g, the components $F_{g\perp}$ and $F_{g\parallel}$, and the angles θ and ϕ.

Known	Unknown
$F_g = 562$ N down	$F_{g\perp} = ?$
$\phi = 30.0°$	$F_{g\parallel} = ?$
	$\theta = ?$

2 SOLVE FOR THE UNKNOWN

$\theta + \phi = 270°$ The angle from the positive *x*-axis to the negative *y*-axis is 270°.

$\theta = 270° - 30°$ Rearrange, substitute $\phi = 30°$, and solve for θ.

$= 240°$

$F_{g\perp} = F_g(\cos\theta)$

$= (562\text{ N})(\cos 240.0°)$ Substitute $F_g = 562$ N, $\theta = 240.0°$.

$= -281$ N

$F_{g\parallel} = F_g(\sin\theta)$

$= (562\text{ N})(\sin 240.0°)$ Substitute $F_g = 562$ N, $\theta = 240.0°$.

$= -487$ N

3 EVALUATE THE ANSWER

- **Are the units correct?** Force is measured in newtons.
- **Do the signs make sense?** The components point in directions opposite to the positive axes.
- **Are the magnitudes realistic?** The values are less than F_g, as expected.

Determine the magnitude and direction of the resultant of two vectors in two dimensions using trigonometry, the Pythagorean theorem (case of perpendicular vectors), and the laws of sines and cosines.

29. An ant climbs at a steady speed up the side of its anthill, which is inclined 30.0° from the vertical. Sketch a free-body diagram for the ant.

31. Fernando, who has a mass of 43.0 kg, slides down the banister at his grandparents' house. If the banister makes an angle of 35.0° with the horizontal, what is the normal force between Fernando and the banister?

تعليم

Explain the motion of horizontally launched projectiles, and show schematically the components of velocity and acceleration

EXAMPLE Problem 1

FINDING THE MAGNITUDE OF THE SUM OF TWO VECTORS Find the magnitude of the sum of a 15-km displacement and a 25-km displacement when the angle θ between them is 90° and when the angle θ between them is 135°.

1 ANALYZE AND SKETCH THE PROBLEM

- Sketch the two displacement vectors, A and B, and the angle between them.

Known
$A = 25$ km $\quad \theta = 90°$ or $\theta_2 = 135°$
$B = 15$ km

Unknown
$R = ?$

2 SOLVE FOR THE UNKNOWN

When θ is 90°, use the Pythagorean theorem to find the magnitude of the resultant vector.

$$R^2 = A^2 + B^2$$

$$R = \sqrt{A^2 + B^2}$$

$$= \sqrt{(25 \text{ km})^2 + (15 \text{ km})^2}$$ Substitute $A = 25$ km, $B = 15$ km

$$= 29 \text{ km}$$

When θ does not equal 90°, use the law of cosines to find the magnitude of the resultant vector.

$$R^2 = A^2 + B^2 - 2AB(\cos \theta_2)$$

$$R = \sqrt{A^2 + B^2 - 2AB(\cos \theta_2)}$$

$$= \sqrt{(25 \text{ km})^2 + (15 \text{ km})^2 - 2(25 \text{ km})(15 \text{ km})(\cos 135°)}$$ Substitute $A = 25$ km, $B = 15$ km, $\theta_2 = 135°$

$$= 37 \text{ km}$$

3 EVALUATE THE ANSWER

- **Are the units correct?** Each answer is a length measured in kilometers.
- **Do the signs make sense?** The sums are positive.
- **Are the magnitudes realistic?** From the sketch, you can see that the resultant should be longer than either vector.

1. You and your family are out for a drive. You drive 125.0 km due west, then turn due south and drive for another 65.0 km. What is the magnitude of your displacement? Solve this problem both graphically and mathematically, and check your answers against each other.
2. On a fine, sunny day, you and your siblings decide to go for a nearby hike. You walk 4.5 km in one direction, then make a 45° turn to the right and walk another 6.4 km. What is the magnitude of your displacement?

فقططط الاساله الاختياراتيه !! .

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