

Find the Missing Force

In each of the problems below, you need to consider a missing force

One possible strategy is to assign directions to the signs of a number:

For horizontal problems:

- All forces to the right are POSITIVE
- All forces to the left are NEGATIVE

For vertical problems:

- All upward forces are POSITIVE
- All downward forces are NEGATIVE

E.1

Three forces act on an object:

345 N left 454 N right ????? N left

Draw a free-body diagram with 3 forces. One of the forces has unknown magnitude:

The net force is 200 N left.

What is the magnitude of the missing force?

E.2

43 down 53 down ??? up

Draw a free-body diagram with 3 forces. One of the forces has unknown magnitude:

The net force is 140 N up.

What is the magnitude of the missing force?

E.3

75 N down 75 N down ??? up

Draw a free-body diagram with 3 forces. One of the forces has unknown magnitude:

The net force is 86 N down.

What is the magnitude of the missing force?

E.4 I'm sitting on a chair.

The chair exerts a force 450 N up. My weight is ?????? N down.

Draw a free-body diagram:

The net force on me is 0 N.

What is my weight [the magnitude of the downward force]?

E.5

20 N up 18 N down ???????

The net force is 38 N down.

Find the magnitude *and direction* of the missing force:

E.6

95 N left

66 N left

??????

The net force is 500 N right

E.7

88 N left

66 N right

27 N left

?????

The net force is 100 N right

Find the magnitude *and direction* of the missing force:

E.8

9 N down

39 N up

85 N down

59 N up

?????

The net force is 0 N.

Find the *magnitude and direction* of the missing force:

E.9 An object with a mass of 50 kg is accelerating at a rate of 4 m/s^2 upward.

There are two force acting on the object:

500 Newtons down and an unknown force up.

a) Use Newton's Second Law to find the *magnitude* of the net force acting on the object:

Looking For	Formula	
Already Know		
Answer as equation <i>with unit</i> :		

b) What is the *direction* of the net force?

c) Draw a free-body diagram with two forces. One force has unknown magnitude.

d) What is the magnitude of the unknown force?

E.10 An object with a mass of 10 kg is accelerating at a rate of 3 m/s^2 to the right:

There are two forces acting on this object:

90 Newtons to the right and an unknown force to the left.

a) Use Newton's Second Law to find the *magnitude* of the net force acting on the object:

Looking For	Formula	
Already Know		
Answer as equation <i>with unit</i> :		

b) What is the *direction* of the net force?

c) Draw a free-body diagram with two forces. One force has unknown magnitude.

d) What is the magnitude of the unknown force?

E.11 An object with a mass of 12 kg is accelerating at a rate of 6 m/s^2 to the left.

There are three forces acting on this object:

100 N to the left

80 N to the right

???? N to the left

a) Use Newton's Second Law to find the *magnitude* of the net force acting on the object:

Looking For	Formula	
Already Know		
Answer as equation <i>with unit</i> :		

b) What is the *direction* of the net force?

c) Draw a free-body diagram with two forces. One force has unknown magnitude.

d) What is the magnitude of the unknown force?

E.12 An object with a mass of 20 kg is accelerating at a rate of 8 m/s^2 to the right.

There are three forces acting on this object:

160 N to the right

75 N to the left

??????

a) Use Newton's Second Law to find the *magnitude* of the net force acting on the object:

Looking For	Formula	
Already Know		
Answer as equation <i>with unit</i> :		

b) What is the *direction* of the net force?

c) What are the *magnitude* and *direction* of the unknown force?

Answers:

E.1 309 N

E.2 236 N

E.3 64 N

E.4 450 N

E.5 40 N down

E.6 661 N right

E.7 149 N right

E.8 4 N down

9. 700 N

10. 60 N

11. 52 N

12. 75 N left