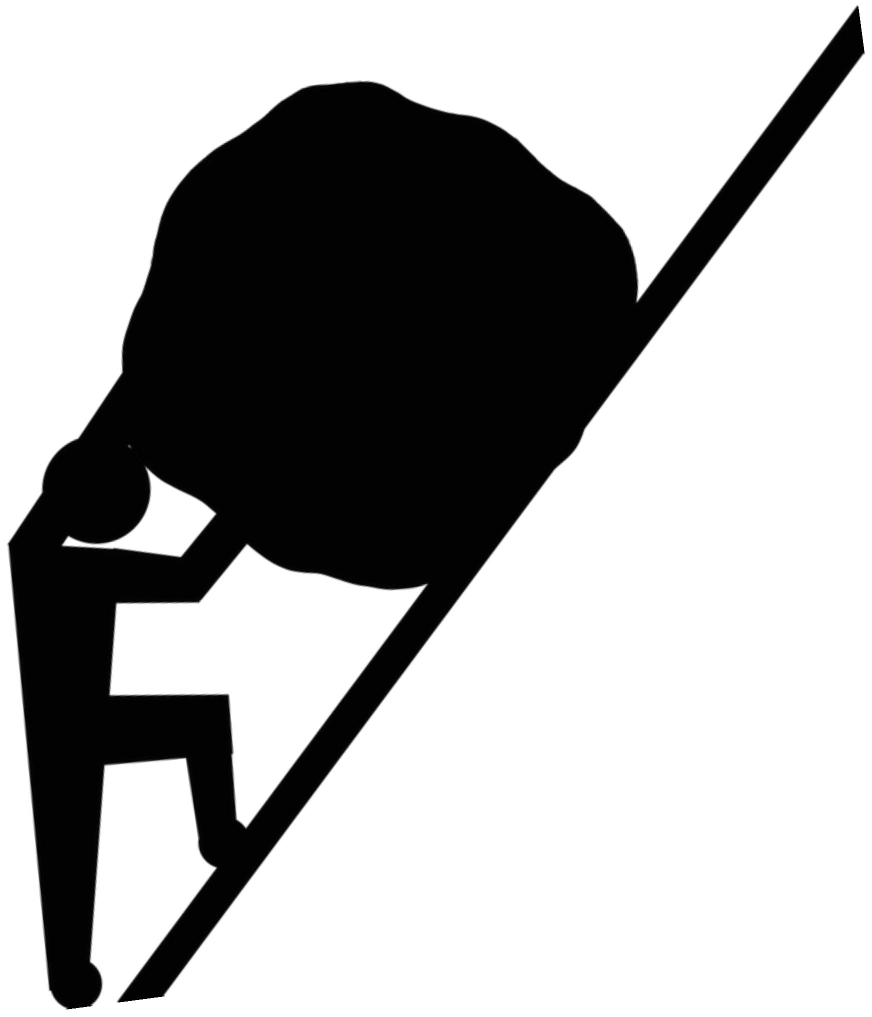
Lesson 6 Simple Machines

Physics - KS3

Forces In Action

Mrs Wolstenholme

Simple Machines



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Simple Machines

Machines don’t have to be complex. A simple machine is one that

- Changes the size of a force
- Changes the direction a force acts in

A simple machine changes:

Option 1

The size of the force

Option 2

The direction of the force

Option 3

The height of the force

Option 4

The width of the force

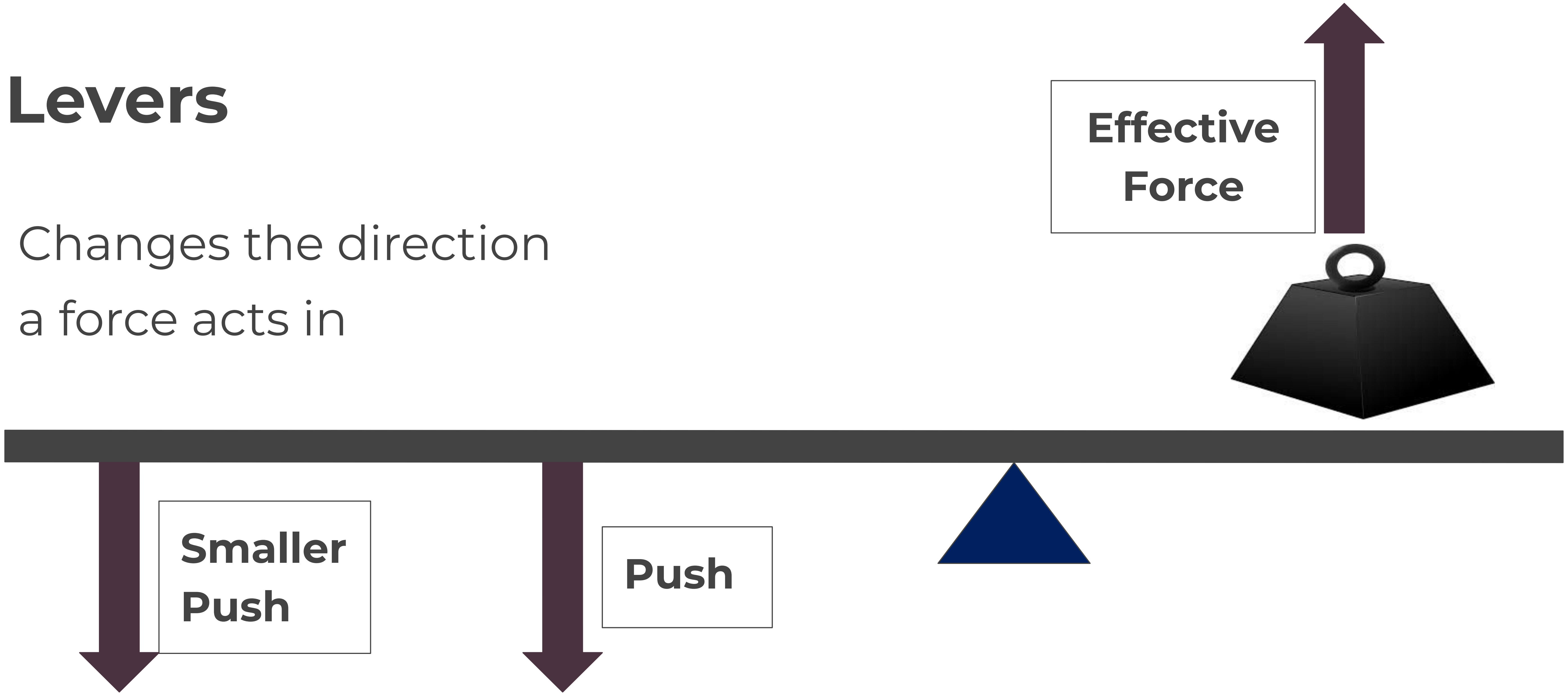
Complete your task

What is a simple machine?

A simple machine changes the ____________ or ____________ of a force.

Levers

Changes the direction a force acts in



Changes the size of the force

Credit: no attribution required

Levers and pulleys can both change

Option 1

The size of the force required

Option 2

The direction of the force

Option 3

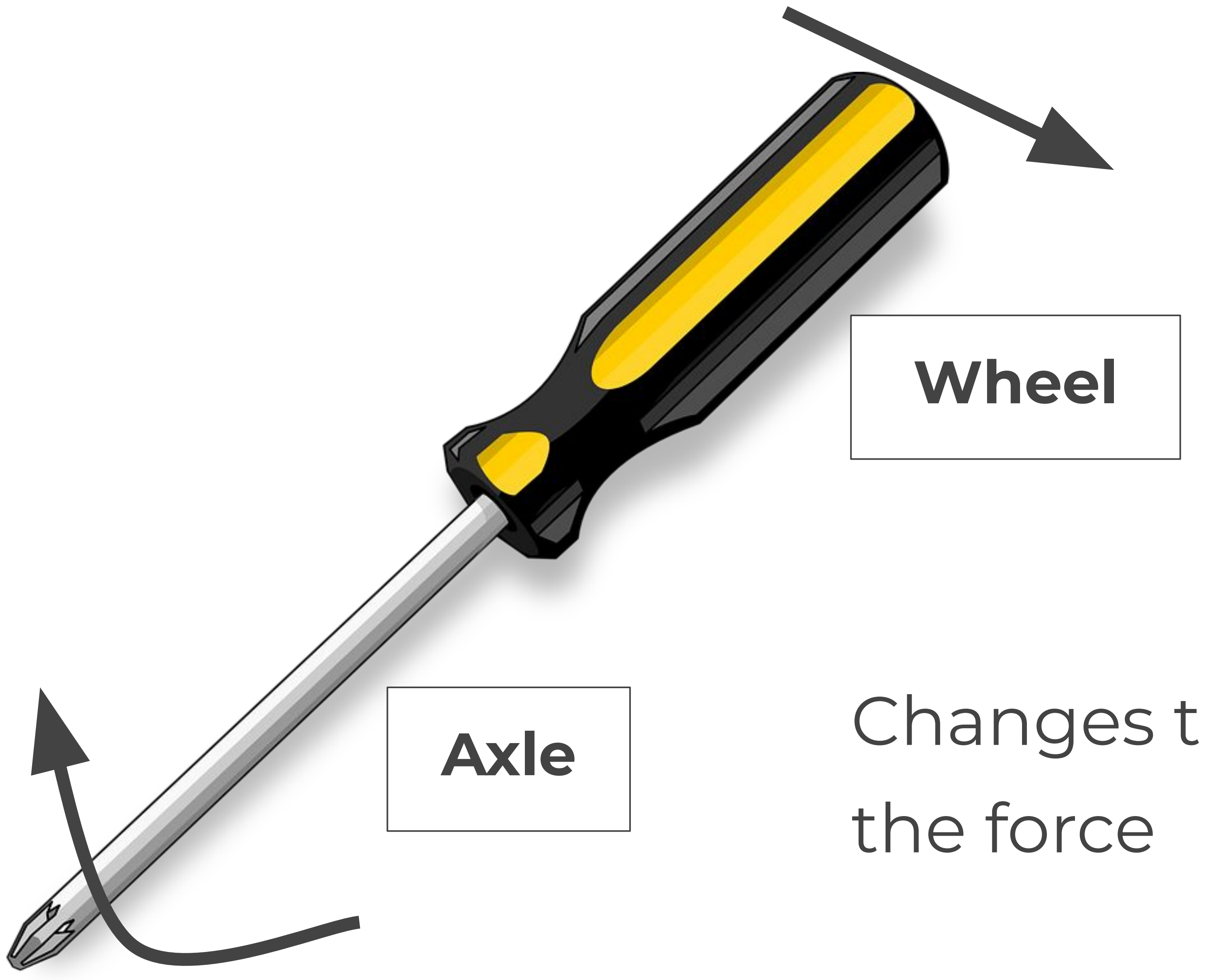
The height of the force

Option 4

The width of the force

Wheel and Axles

One wheel and one axle or two wheels connected by an axle



Changes the size of the force

Credit: no attribution required

Wheel and Axles

Moment = 100 Ncm

Moment = Force x Distance

100 = Force x 5

Force = 20 N

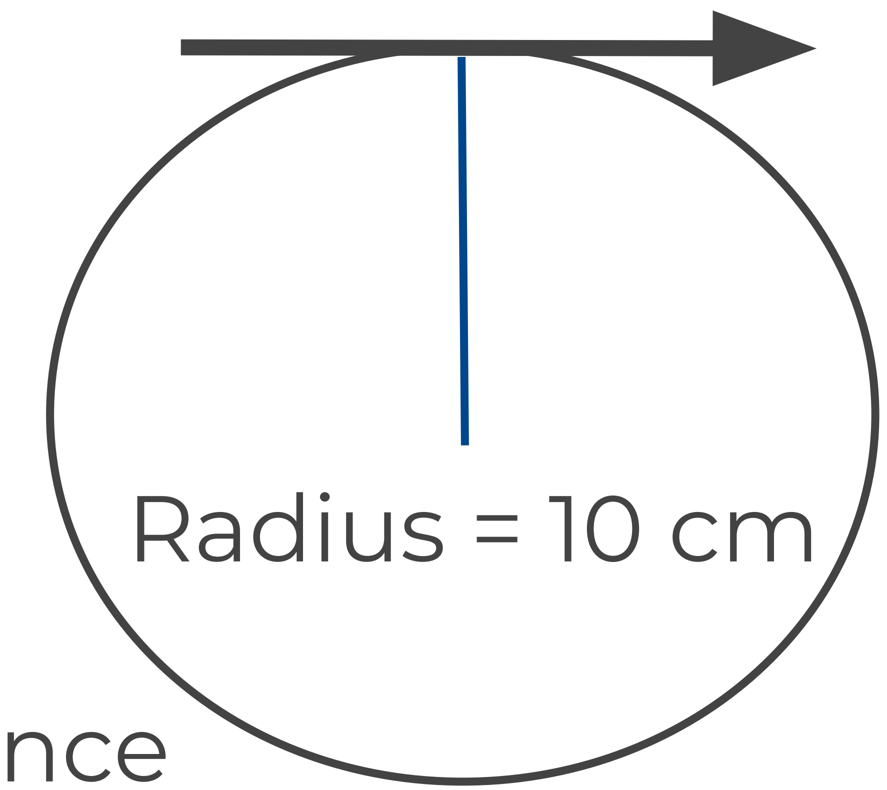
Radius = 5 cm

Force = ??

Axle

Wheel

Force = 10 N



Moment = Force x Distance

Moment = 10 x 10 = 100 Ncm

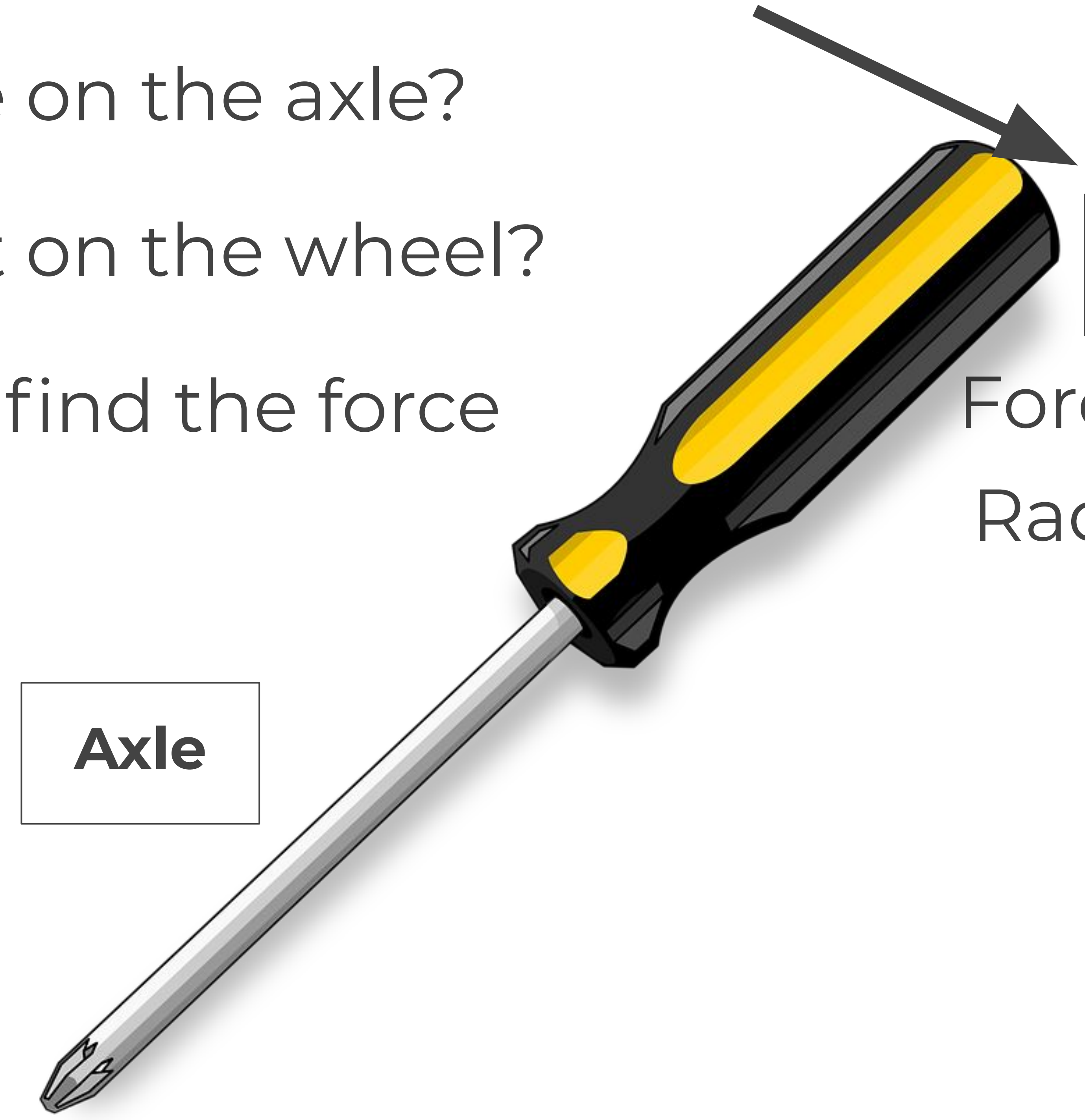
Credit: no attribution required

Wheel and Axles

Your Turn: What is the force on the axle?

Step 1: What is the moment on the wheel?

Step 2: Use this moment to find the force on the axle.



Wheel

Force = 10 N

Radius = 20 cm

Axle

Radius = 4 cm

Force = ? N

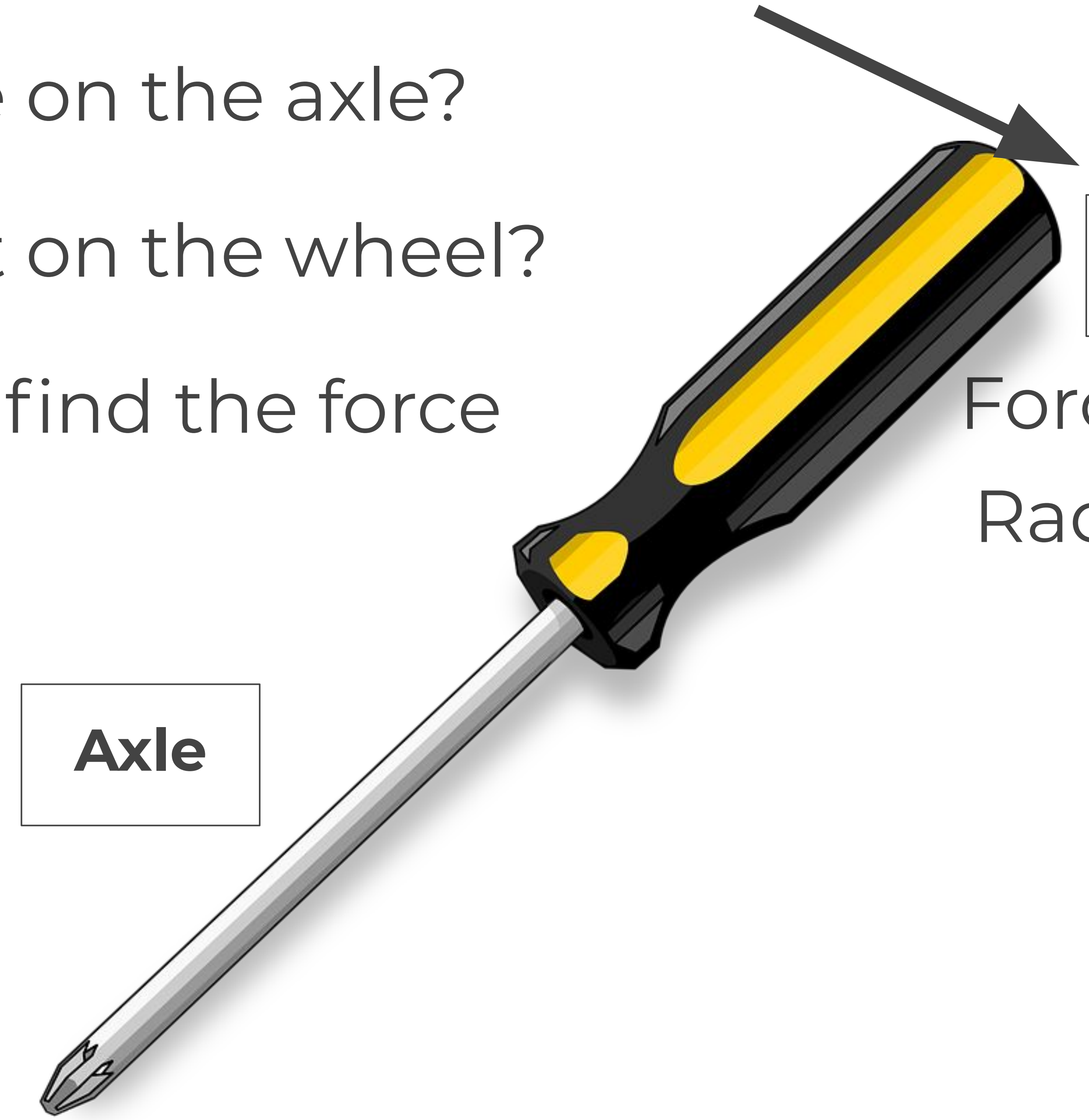
Credit: no attribution required

Wheel and Axles

Your Turn: What is the force on the axle?

Step 1: What is the moment on the wheel?

Step 2: Use this moment to find the force on the axle.



Wheel

Force = 5 N

Radius = 30 cm

Axle

Radius = 15 cm

Force = ? N

Credit: no attribution required

What do the grooves in a screw do to the force?

Option 1

Change the height

Option 2

Change the colour

Option 3

Change the type

Option 4

Change the direction

Which one is larger the wheel or the axle?

Option 1

Wheel

Option 2

Axle

What happens to the axle when the wheel rotates?

Option 1

Jumps up and down

Option 2

Nothing

Option 3

Rotates as well

Option 4

Plays hide and seek

What happens to the wheel when the axle rotates?

Option 1

Jumps up and down

Option 2

Nothing

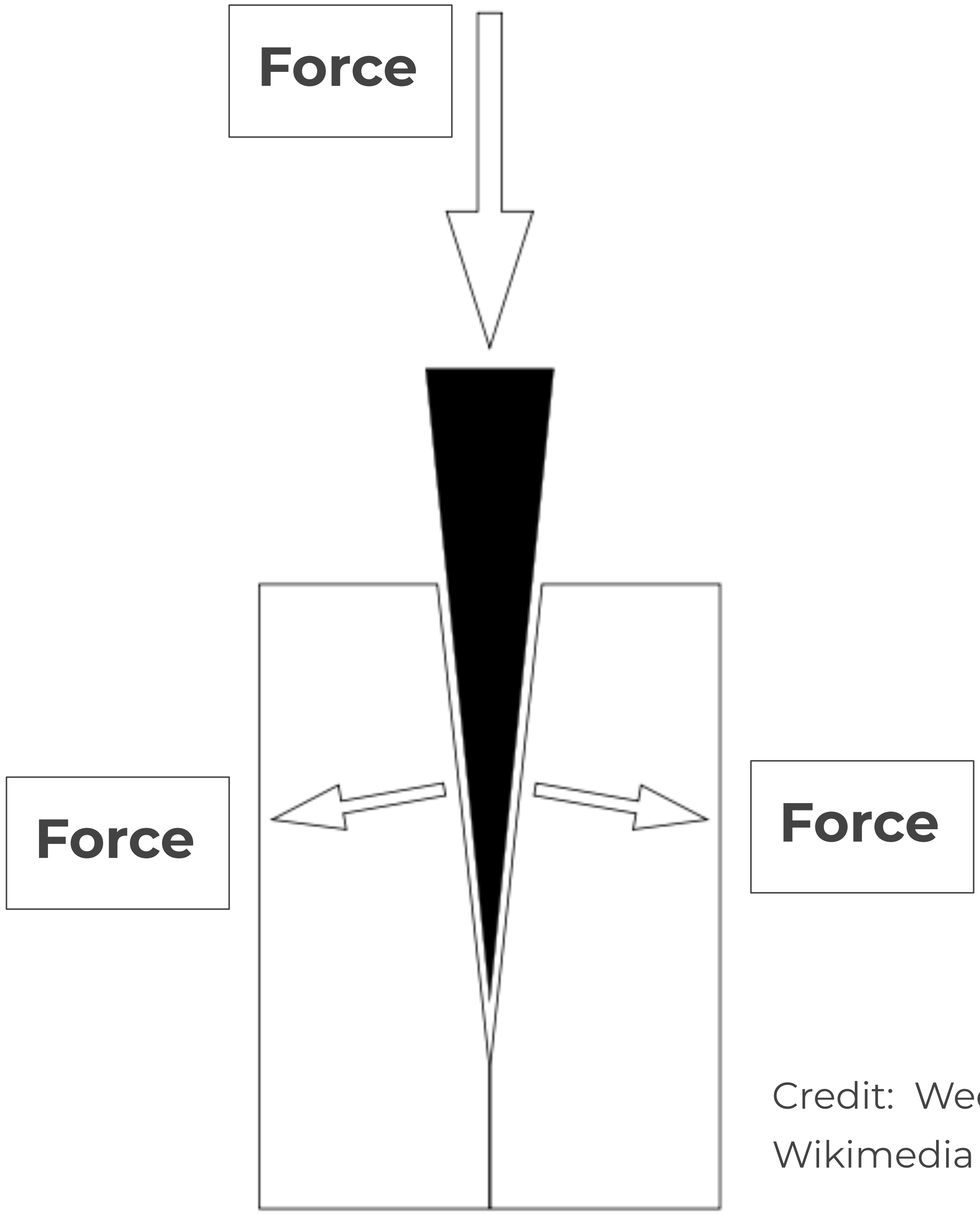
Option 3

Rotates as well

Option 4

Plays hide and seek

Wedges



Changes the direction a force acts in

Credit: Wedge-Diagram Iainf Wikimedia

How does an inclined plane make it easier to move heavy objects to a certain height?

Option 1

The distance is longer

Option 2

The force required is smaller

Option 3

The height is smaller

Option 4

The width of the force is smaller

What is a wedge?

Option 1

A simple machine that changes the direction of the force

Option 2

A flat object

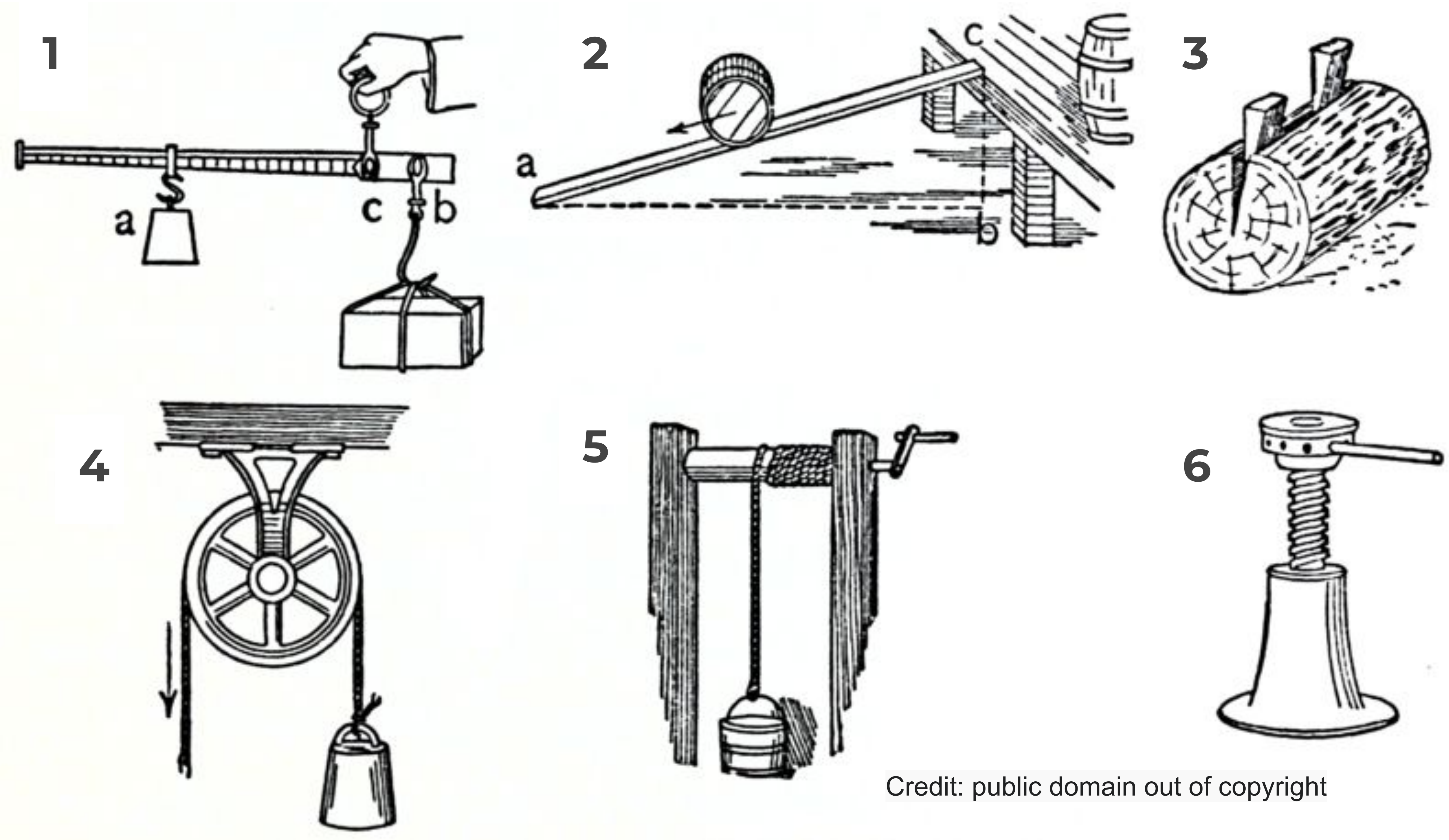
Option 3

A pulley

Option 4

An object that is thin at one end and wider at the other

Independent Task



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Label these diagrams with the names of the simple machines.

Describe how two of them work. Remember they all either change the size, or the direction of the force.

Analysing Data

Radius of cog (cm)	Average Force Applied (N)	Distance Moved (cm)
5	105.0	10
10	50.0	20
15	33.3	30
20	25.0	40
25	20.0	50

What is the relationship between the radius of cog and the average force applied?

The larger the radius the smaller the average force applied.

Analysing Data

Radius of cog (cm)	Average Force Applied (N)	Distance Moved (cm)
5	105.0	10
10	50.0	20
15	33.3	30
20	25.0	40
25	20.0	50

Your Turn:

What is the relationship between the radius of cog and the distance moved?

The larger the radius the ………

Analysing Data

Angle of inclined Plane	Average Force Applied (N)
10	2.2
20	3.5
30	4.5
40	5.6
90 (no plane)	9.8

Your Turn:

What is the relationship between the angle of incline and the average force?

Analysing Data

Angle of inclined Plane	Average Force Applied (N)
10	2.2
20	3.5
30	4.5
40	5.6
90 (no plane)	9.8

Your Turn:

What is the relationship between the angle of incline and the average force?

The larger the angle of inclined plane, the larger the average force applied.

Was the hypothesis correct?

Analysing Data

Number of Pulleys	Average Force Applied (N)
0	100
1	100
2	50
3	25
4	13

Your Turn:

What is the relationship between the number of pulleys and the average force?

Analysing Data

Number of Pulleys	Average Force Applied (N)
0	100
1	100
2	50
3	25
4	13

Is it still useful to have one pulley even though the average force is the same?

Well Done !!