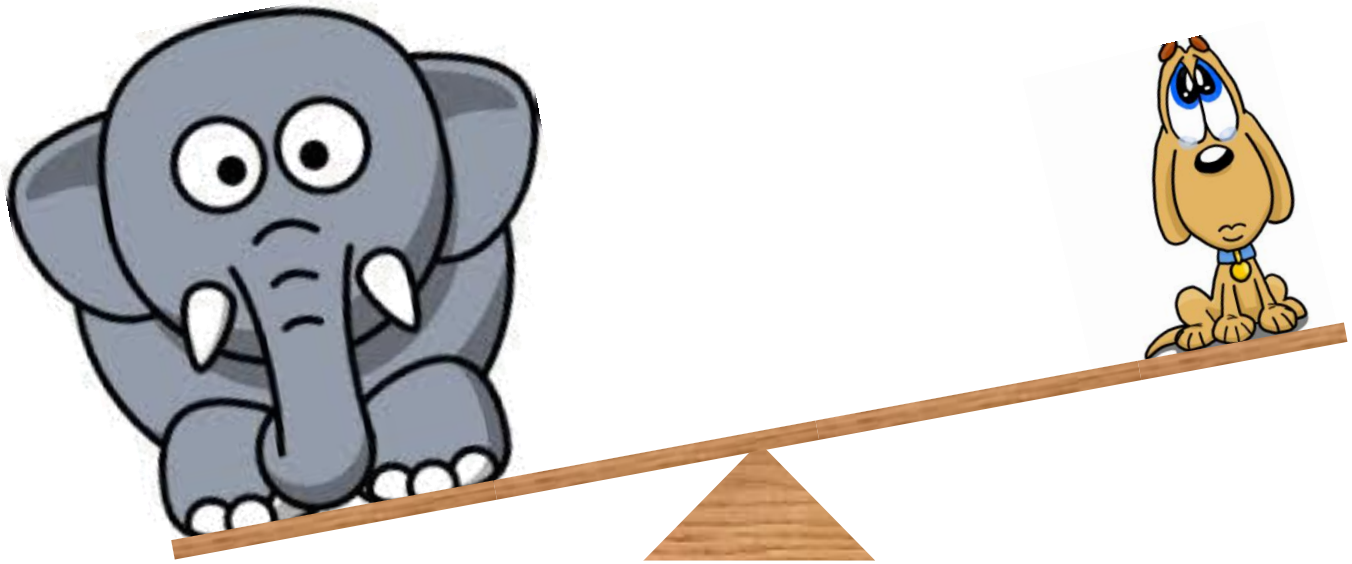
Learning objective: Why use screwdrivers to open paint tins?

Level 4:
Identify the pivot in a lever

Level 5:
Calculate moments

Level 6:
Describe the relationship between moment and force

How can we balance this seesaw?



Anyone who has never made a mistake has never tried anything new.

- Albert Einstein

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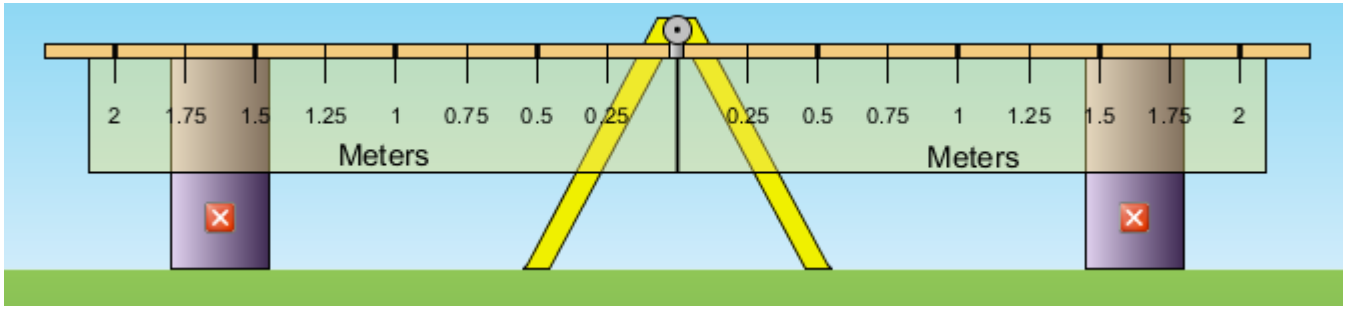
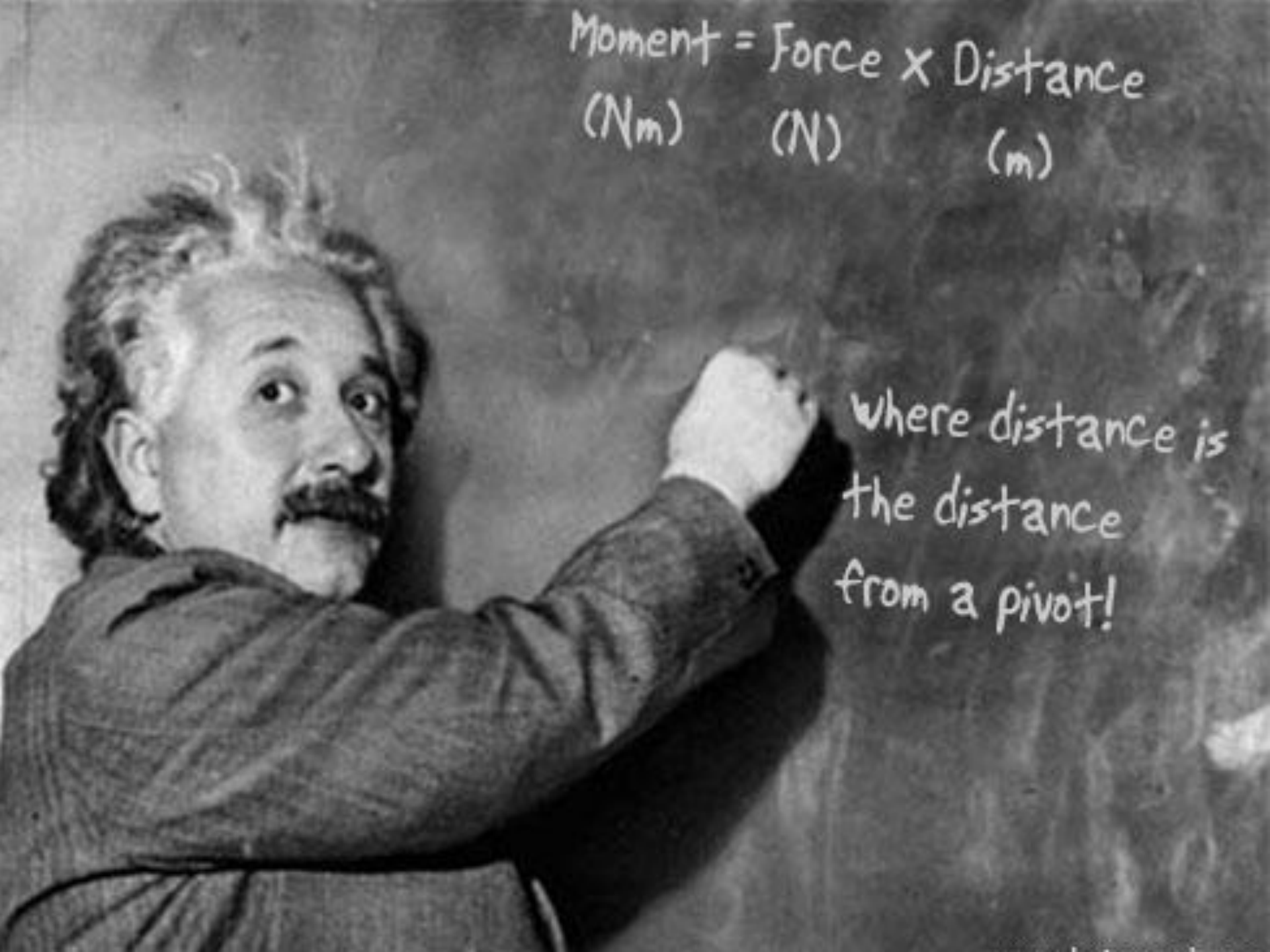
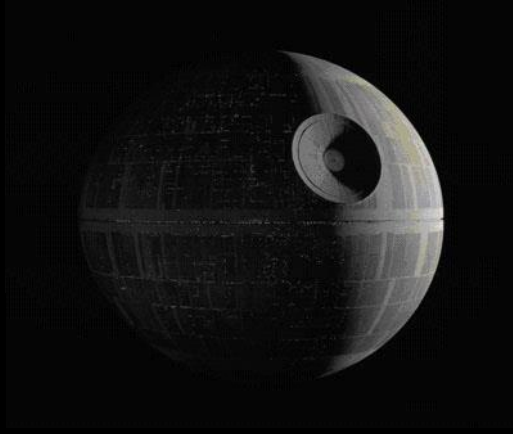
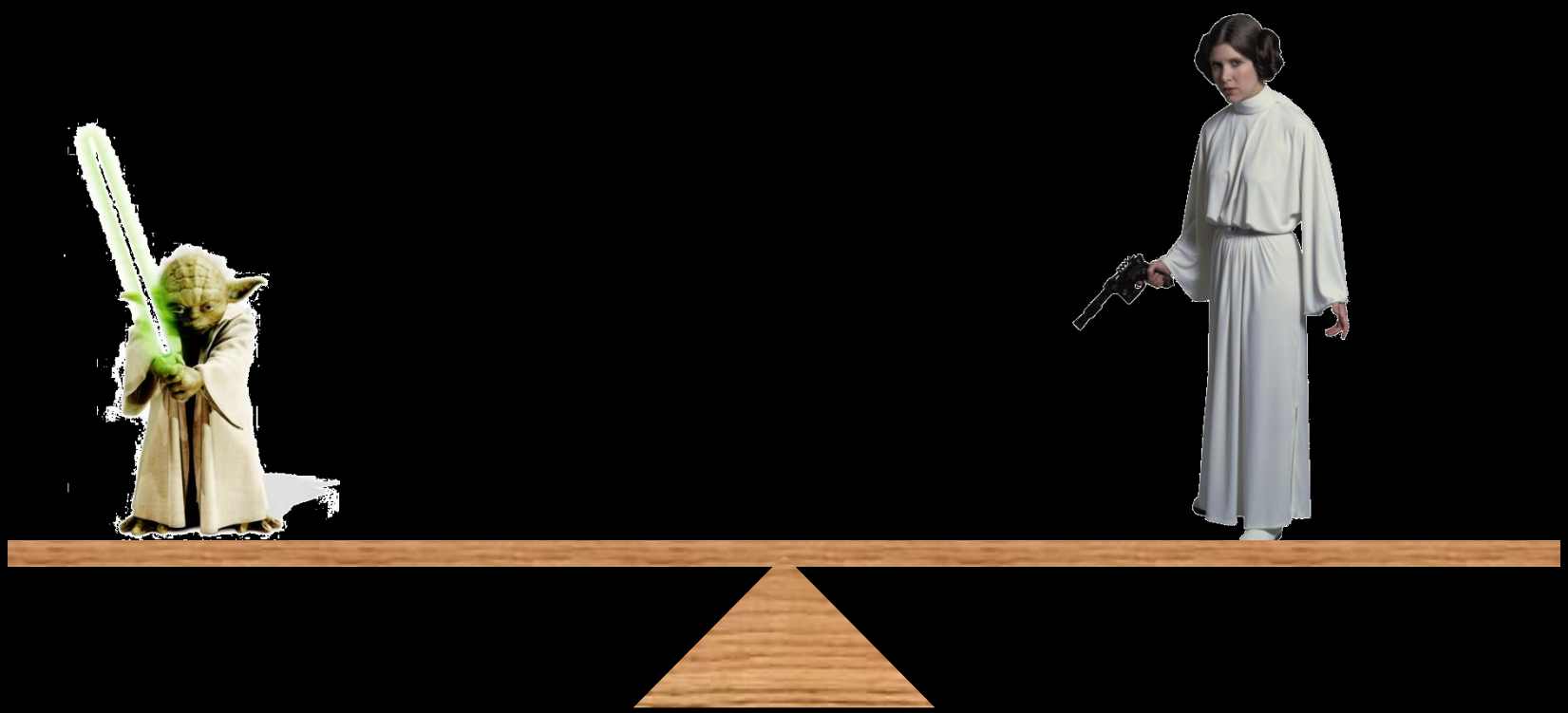
Let's try it with numbers!




Moment = Force x Distance
(Nm) (N) (m)
where distance is
the distance
from a pivot!

STAR WARS SEE SAWS





Moment = Force x Distance

(Nm) (N) (m)

Moment = 500 N x 10 m

= 5000 Nm

Moment = 550 N x 6 m

= 3300 Nm

5000 Nm – 3300 Nm = 1700 Nm

Anti-clockwise

YODA WINS

500 N

10 m

6 m

550 N

Round 2

Moment = Force x Distance

(Nm) (N) (m)

Moment = 500 N x 10 m

= 5000 Nm

Moment = 1200 N x 7 m

= 8400 Nm

8400 Nm – 5000 Nm = 3400 Nm

Clockwise

DARTH VADER WINS

Round 3

Moment = Force x Distance

(Nm) (N) (m)

Moment = 750 N x 11 m

= 8250 Nm

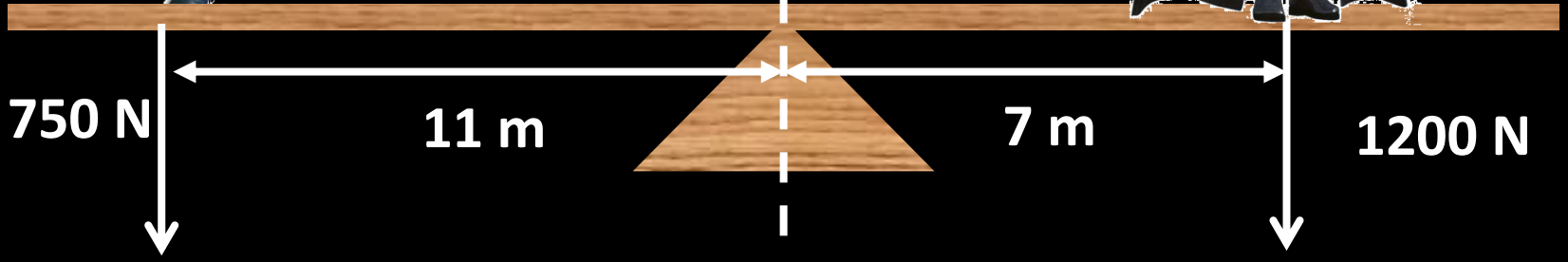
Moment = 1200 N x 7 m

= 8400 Nm

8400 Nm – 8250 Nm = 150 Nm

Clockwise

DARTH VADER WINS



Round 4

Moment = Force x Distance

(Nm) (N) (m)

Moment = 3000 N x 8 m

= 24000 Nm

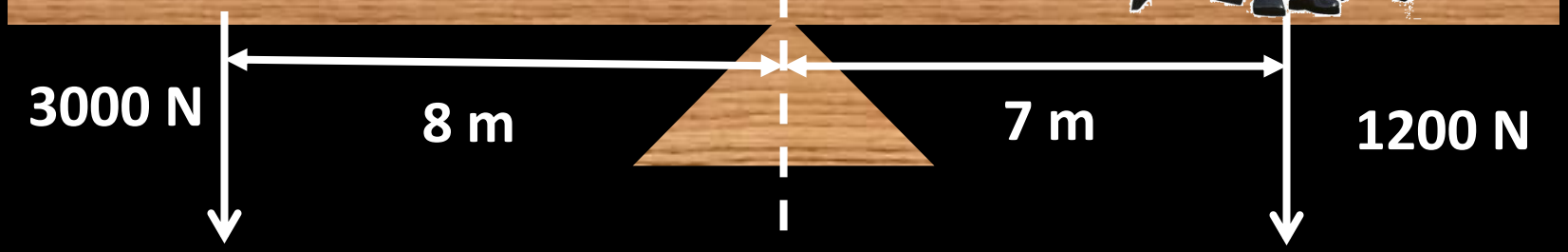
Moment = 1200 N x 7 m

= 8400 Nm

24000 Nm – 8400 Nm = 15600 Nm

Anti-clockwise

JABBA THE HUTT WINS



Learning objective: Why use screwdrivers to open paint tins?

Level 4:
Identify the pivot in a lever

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Level 6:
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Worksheets

Time to end of question 2

Answers

1. 12 Nm
2. 4.5 Nm

Learning objective: Why use screwdrivers to open paint tins?

Level 4:
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Worksheets

Time to end of question 6

Answers

3. Balanced
4. Unbalanced
5. Unbalanced
6. Unbalanced

Learning objective: Why use screwdrivers to open paint tins?

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Worksheets

Time to end of question 8

Answers

7. Anticlockwise
8. Clockwise

Applications of moments

Learning objective: Why use screwdrivers to open paint tins?

Level 4:
Identify the pivot in a lever

Level 5:
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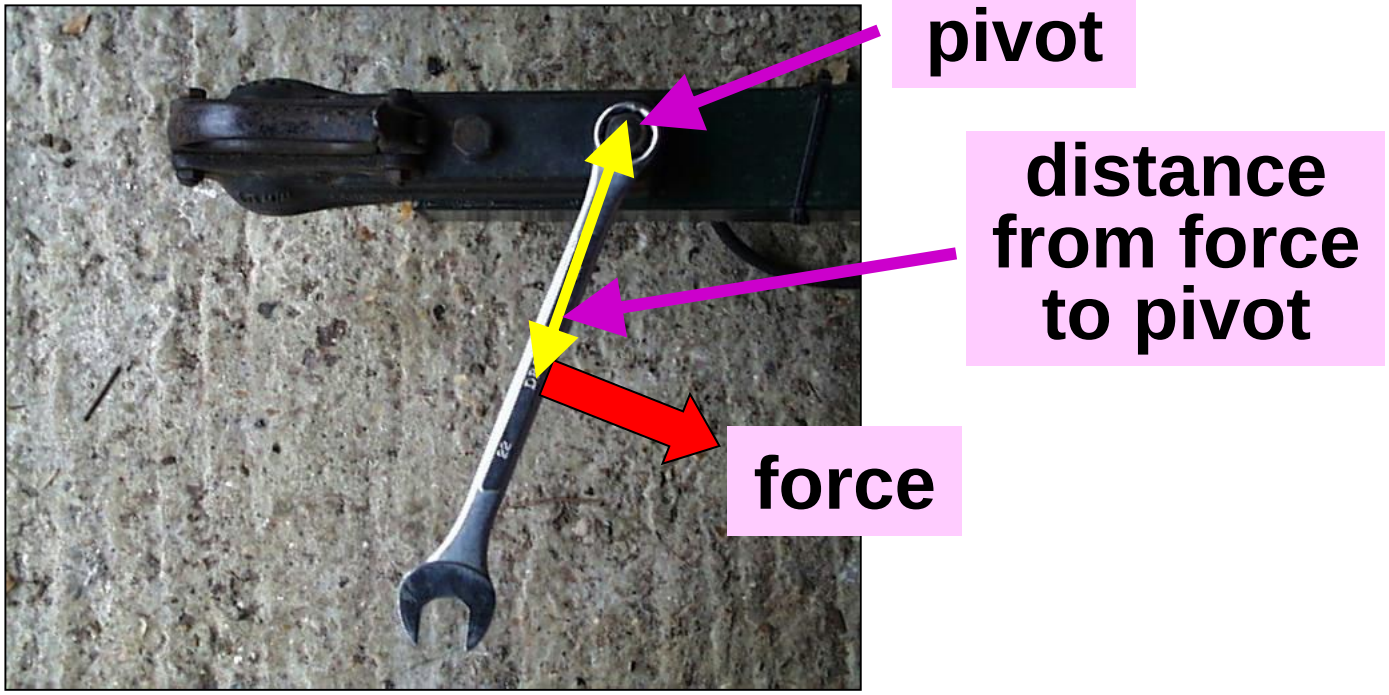
Level 6:
Describe the relationship between moment and force

A spanner is a **lever** that can be used to unscrew a nut.

The spanner exerts a moment or turning effect on the nut.



It is important to be able to identify where the pivot is, where the force is being applied as a distance from the pivot, and the size of that force

Learning objective: Why use screwdrivers to open paint tins?

Level 4:
Identify the pivot in a lever

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Calculate moments

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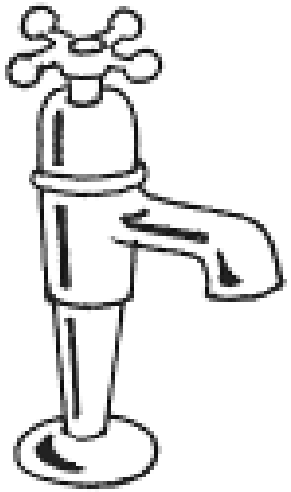
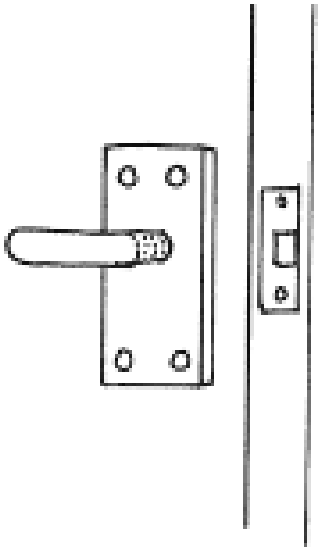
Describe the relationship between moment and force

Where is the pivot and in which direction is the force applied in these examples?





Learning objective: Why use screwdrivers to open paint tins?

Level 4:
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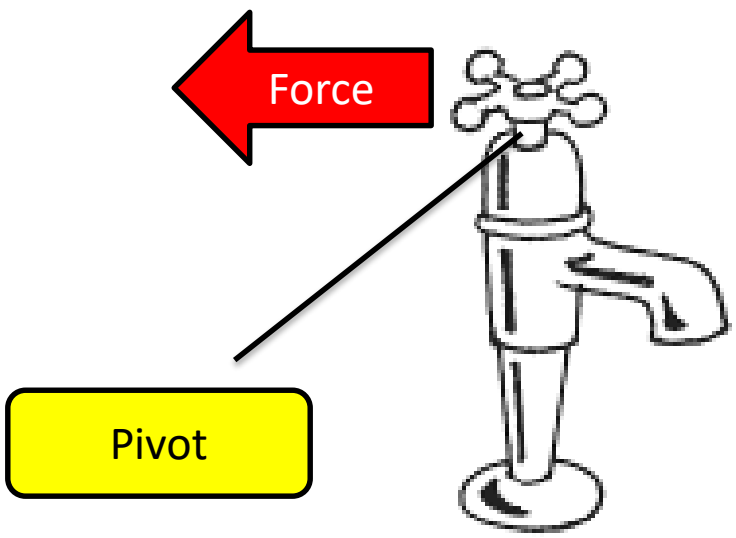
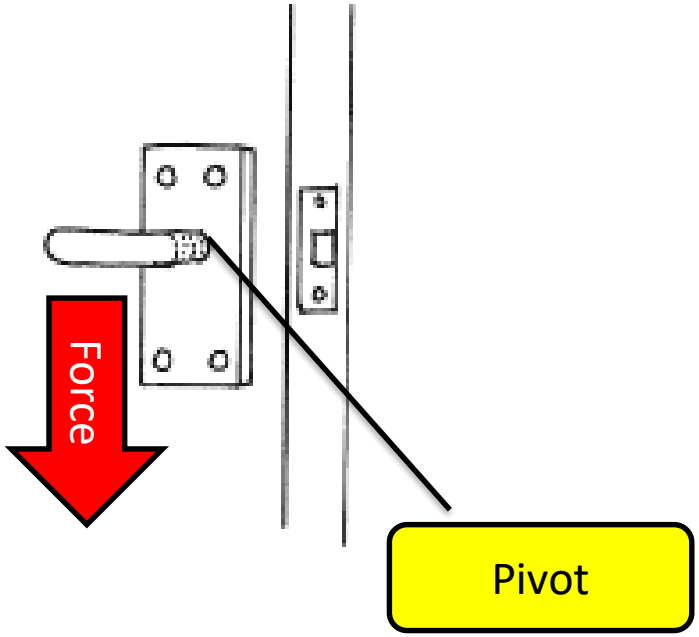
Answers





Learning objective: Why use screwdrivers to open paint tins?

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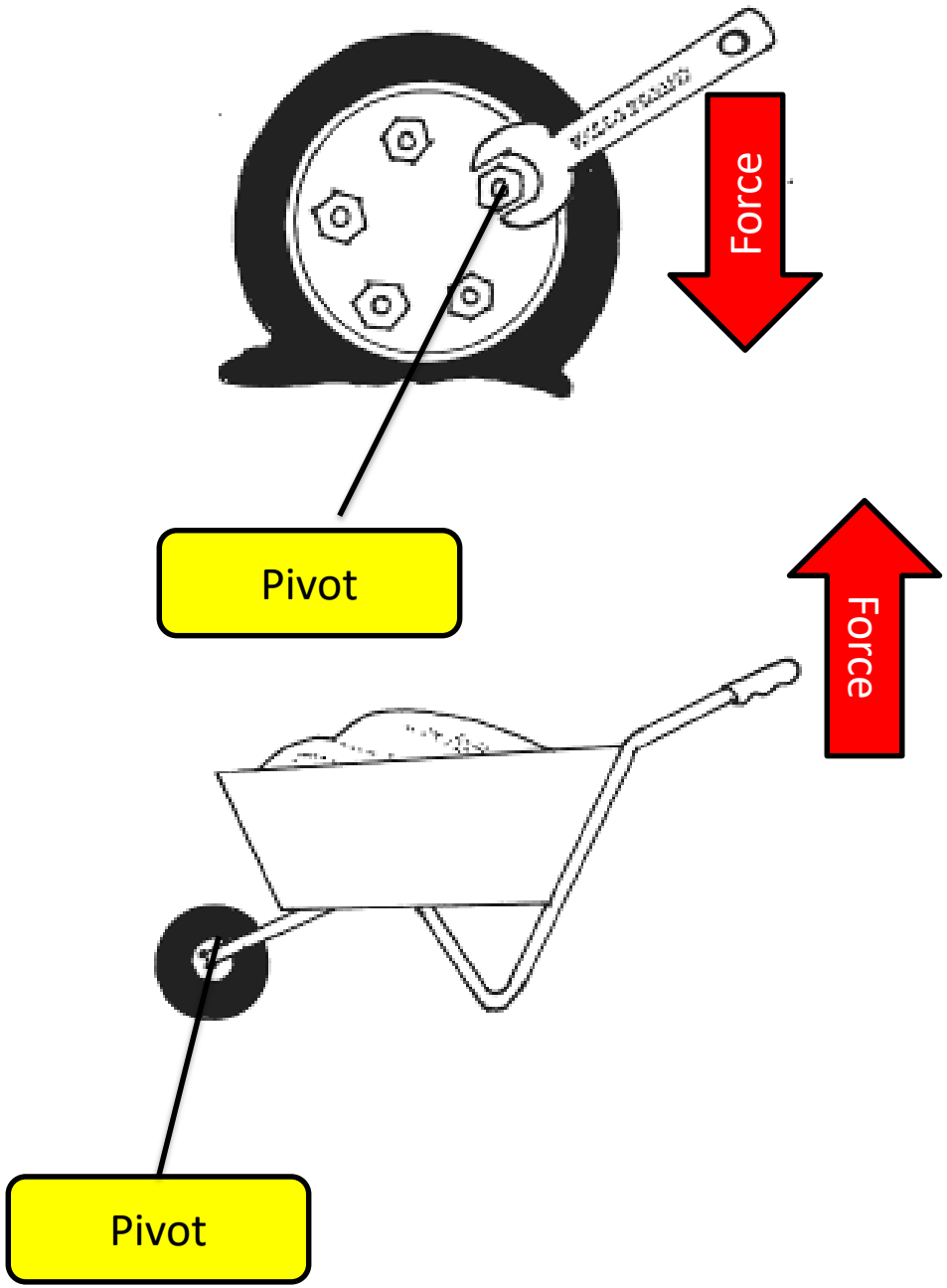

Learning objective: Why use screwdrivers to open paint tins?

Level 4:
Identify the pivot in a lever

Level 5:
Calculate moments

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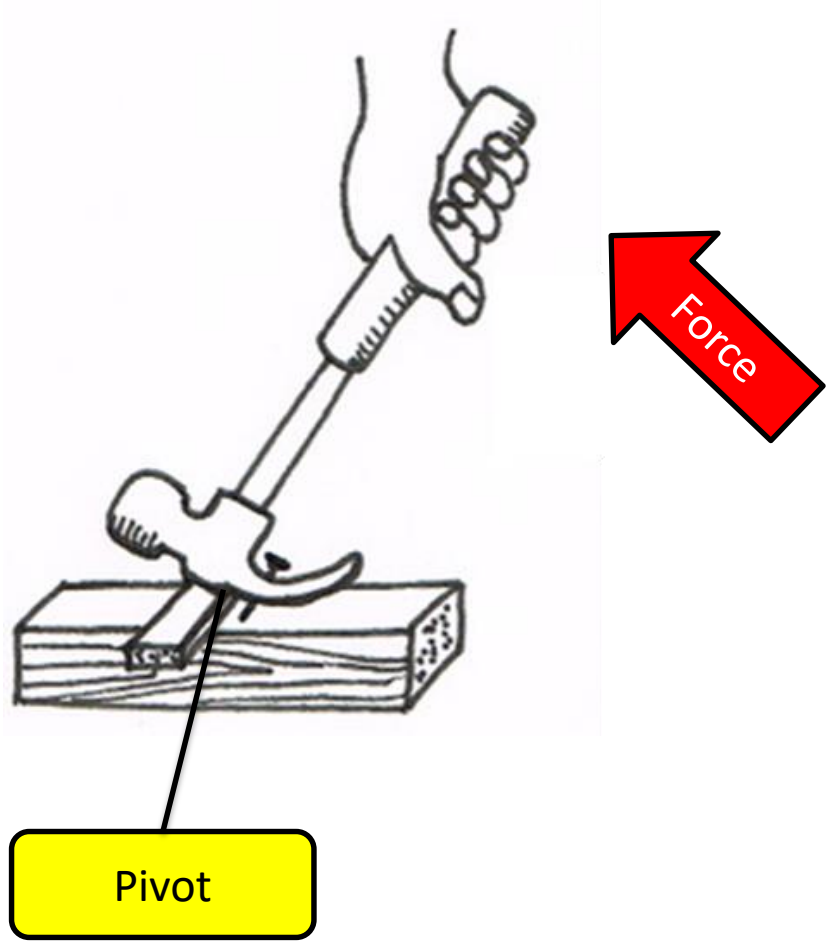
Describe the relationship between moment and force



Learning objective: Why use screwdrivers to open paint tins?

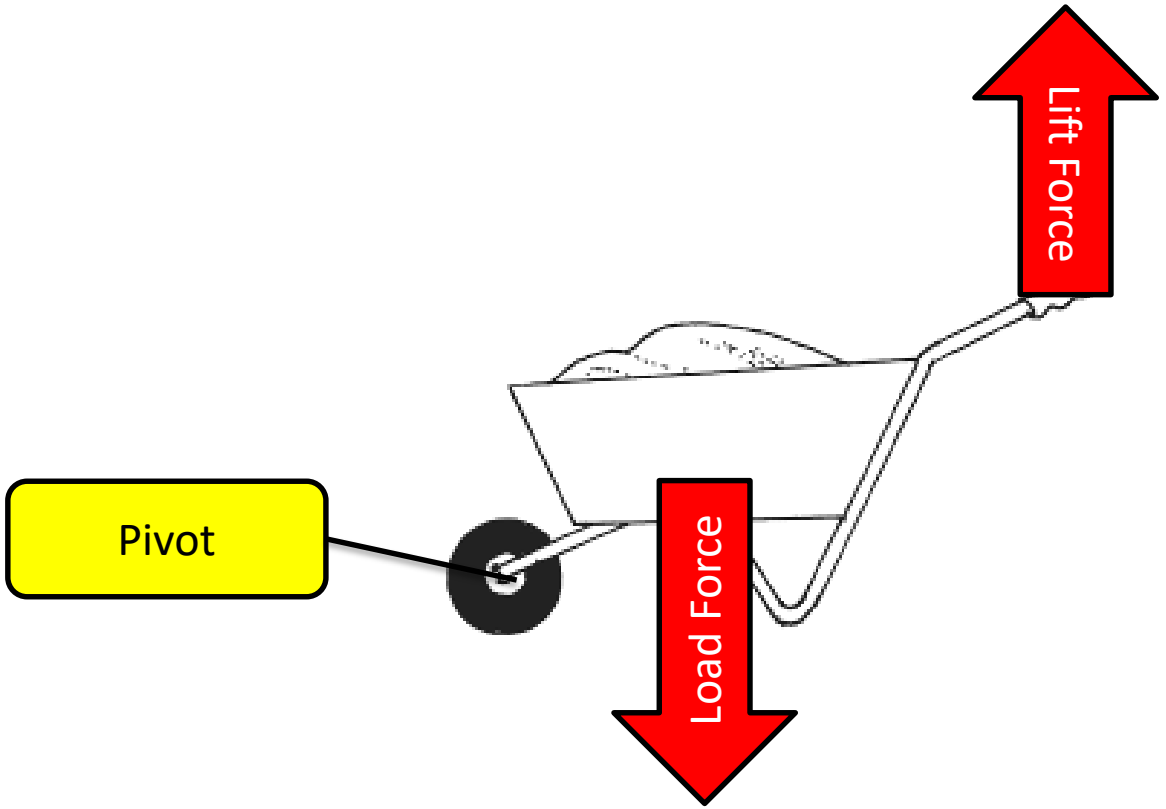
Level 4:
Identify the pivot in a lever

Level 5:
Calculate moments

Level 6:
Describe the relationship between moment and force

Pause for thought…

What's the difference between the position of the forces acting on a wheelbarrow compared to a seesaw?



Learning objective: Why use screwdrivers to open paint tins?

Answers

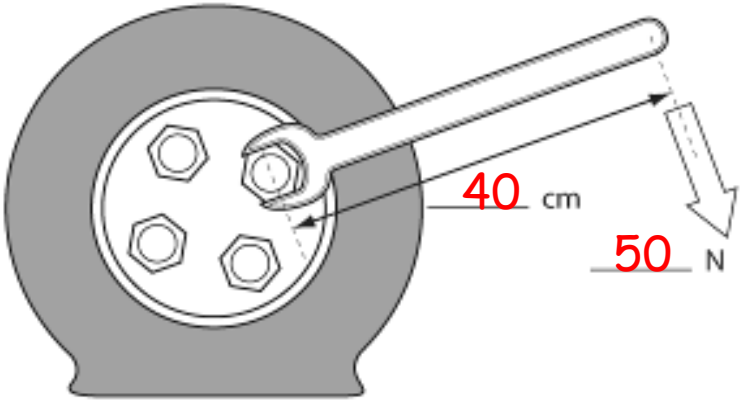
Level 4:
Identify the pivot in a lever

Level 5:
Calculate moments

Level 6:
Describe the relationship between moment and force

A mechanic pushes on a spanner with a force of 50N. He pushes on the spanner 40cm from the end of the spanner.

a) Write the force and the distance on your diagram
b) Calculate the moment of the force using this information.



Moment of the force (Nm) = Force (N) x Distance from pivot (m)
Moment of the force (Nm) = 50 N x 0.4 m
Moment of the force (Nm) = 20 Nm

c) (i) Would the moment be bigger or smaller if he used a longer spanner?

bigger

(ii) Explain your answer to part (i).

Multiple answers acceptable as long as distance from the pivot is central to the explanation.

Learning objective: Why use screwdrivers to open paint tins?

Level 4:
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Level 6:
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Quiz

What is the name given to an object that uses moments as a "force multiplier"?

Lever

Learning objective: Why use screwdrivers to open paint tins?

Level 4:
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Level 5:
Calculate moments

Level 6:
Describe the relationship between moment and force

Quiz

What is the equation for moment?

Moment = Force x distance (from pivot)

Learning objective: Why use screwdrivers to open paint tins?

Level 4:
Identify the pivot in a lever

Level 5:
Calculate moments

Level 6:
Describe the relationship between moment and force

Quiz

What is the unit for moment?

Nm

Learning objective: Why use screwdrivers to open paint tins?

Quiz

Level 4:
Identify the pivot in a lever

Level 5:
Calculate moments

Level 6:
Describe the relationship between moment and force

How do we get an elephant and a dog to balance on a seesaw?

Move the elephant (much) closer to the pivot than the dog.

Learning objective: Why use screwdrivers to open paint tins?

Level 4:
Identify the pivot in a lever

Level 5:
Calculate moments

Level 6:
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Quiz

Name 3 examples of levers

Lots to choose from, could have:

- **Spanner**
- **Wrench**
- **Claw hammer**
- **Wheelbarrow**
- **Tap head**
- **Etc…**

Learning objective: Why use screwdrivers to open paint tins?

Exit ticket

Level 4:
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Level 5:
Calculate moments

Level 6:
Describe the relationship between moment and force