Moment(Torque)

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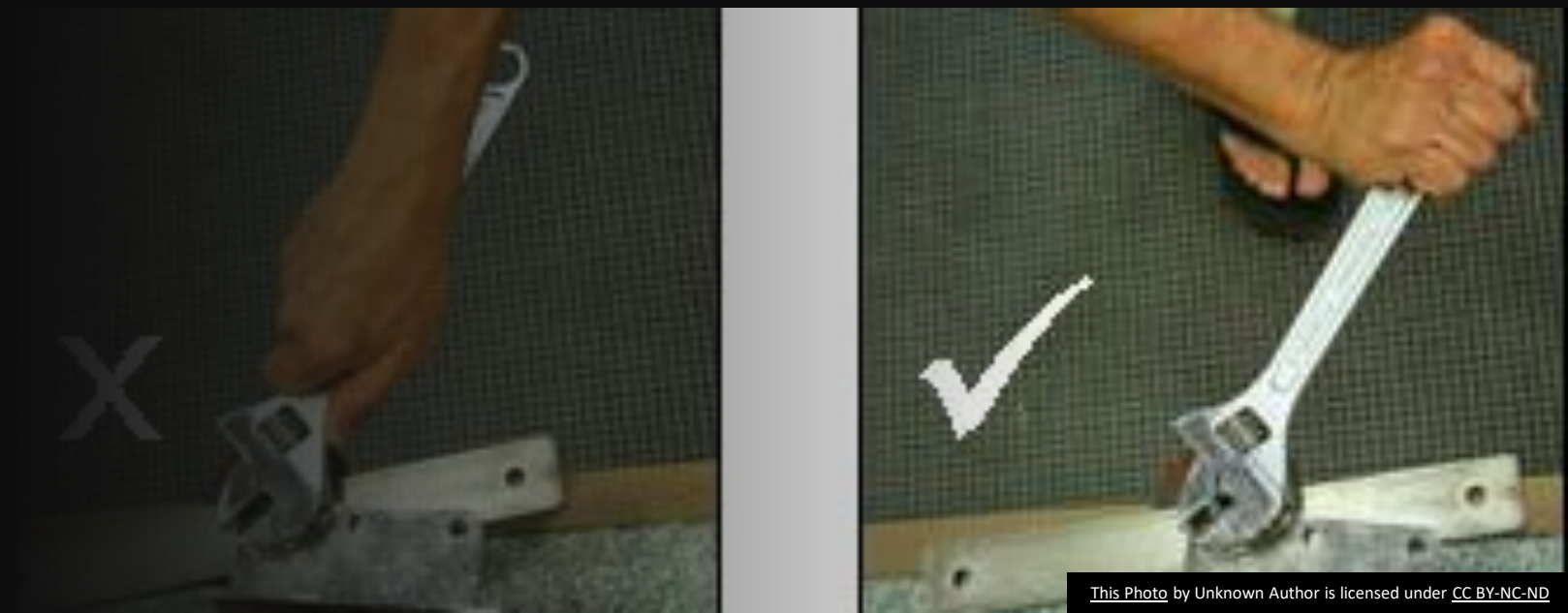

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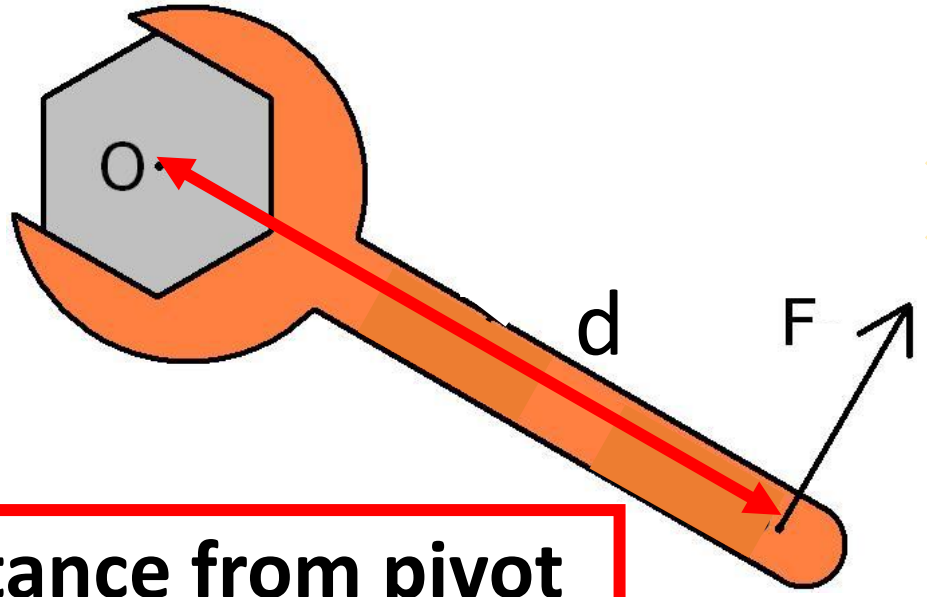
Objectives

LEARNING OBJECTIVES

- Know and use the relationship between the moment of a force and its perpendicular distance from the pivot:

  moment = force × perpendicular distance from the pivot
- Know that the weight of a body acts through its centre of gravity
- Use the principle of moments for a simple system of parallel forces acting in one plane
- Understand how the upward forces on a light beam, supported at its ends, vary with the position of a heavy object placed on the beam

Moment(torque)



Moment of a force is defined as:

moment = force × perpendicular distance from pivot

moment= F × d

- SI unit of moment is N m.
- moment is a vector quantity.
- Directions: Clockwise or anticlockwise

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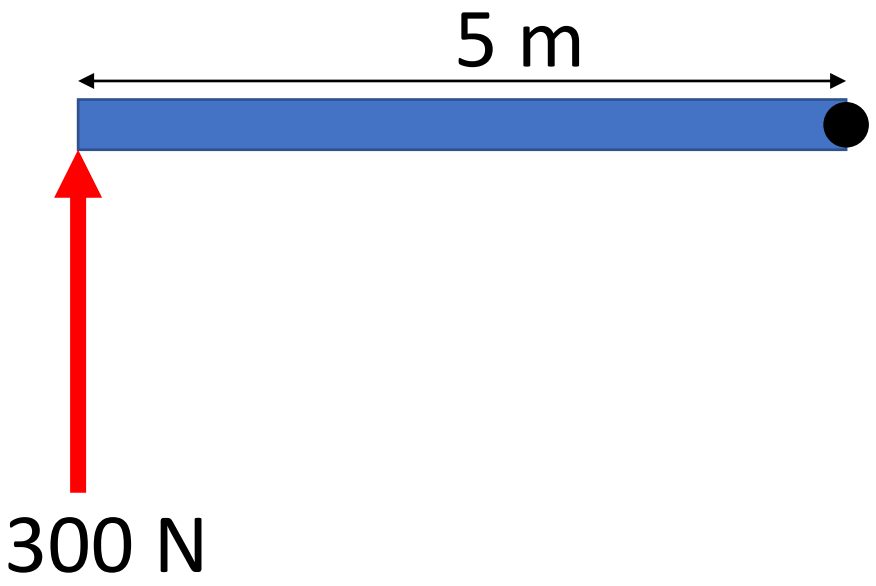
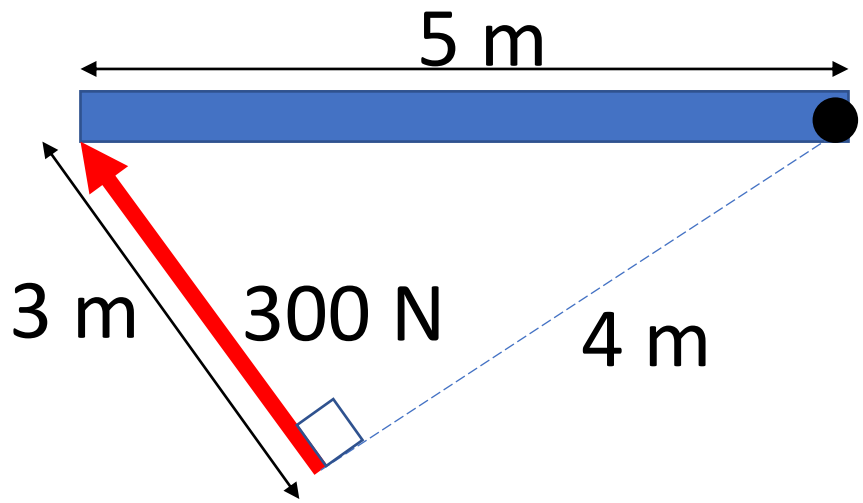
Concept learning questions

1)





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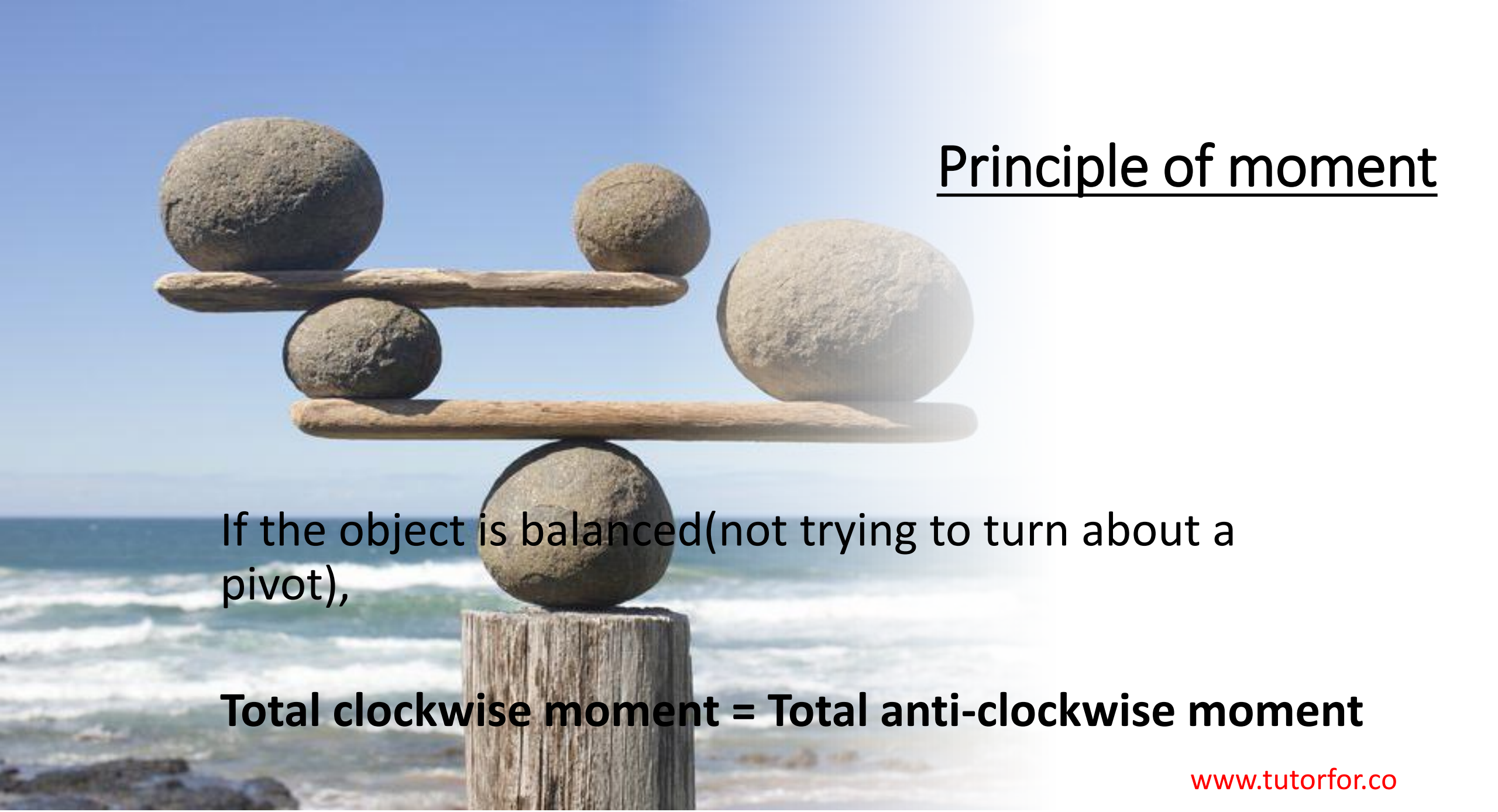

Principle of moment

If the object is balanced(not trying to turn about a pivot),

Total clockwise moment = Total anti-clockwise moment

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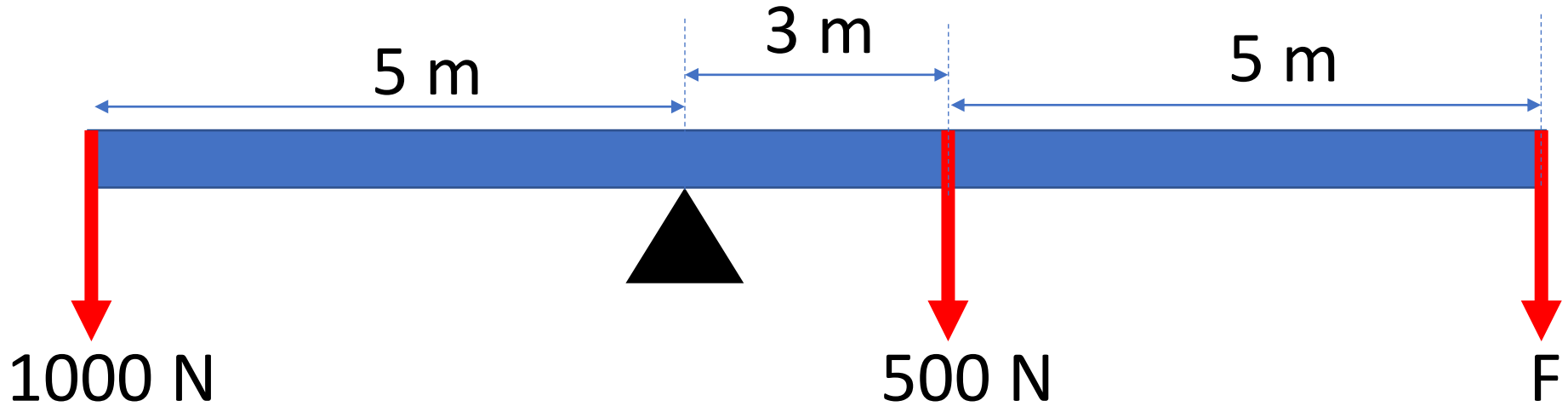
Concept-Learning questions



The above rod is balanced on the pivot. Find the force F.

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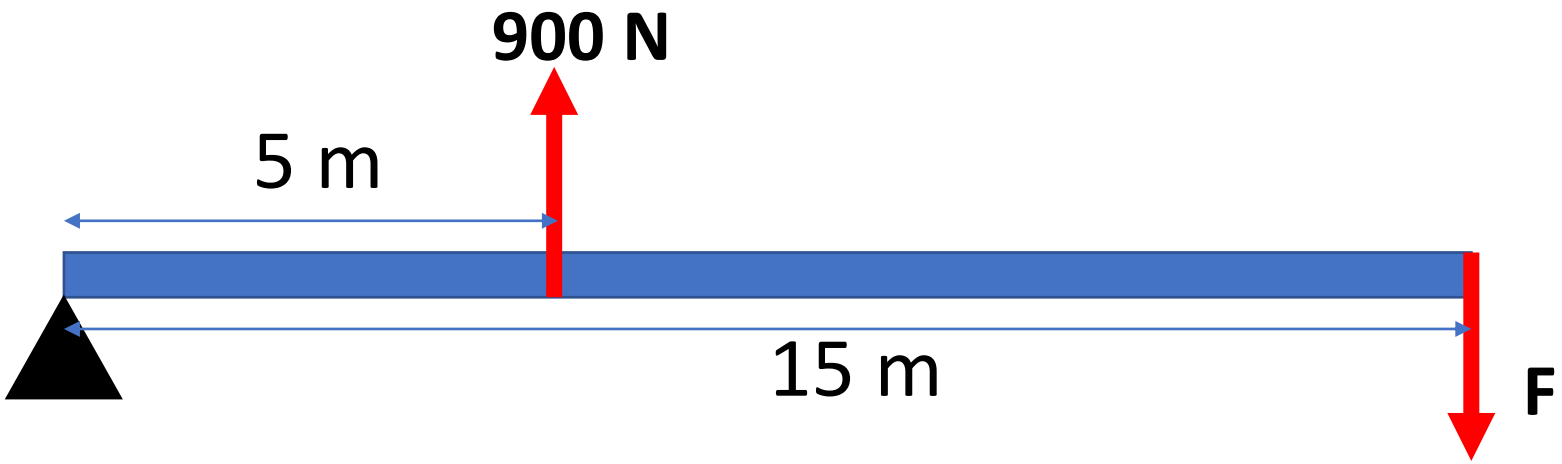
Concept learning questions



The above rod is balanced on the pivot. Find the force F.

Centre of gravity

- The point where the whole of the weight of an object appears to act is called centre of gravity.

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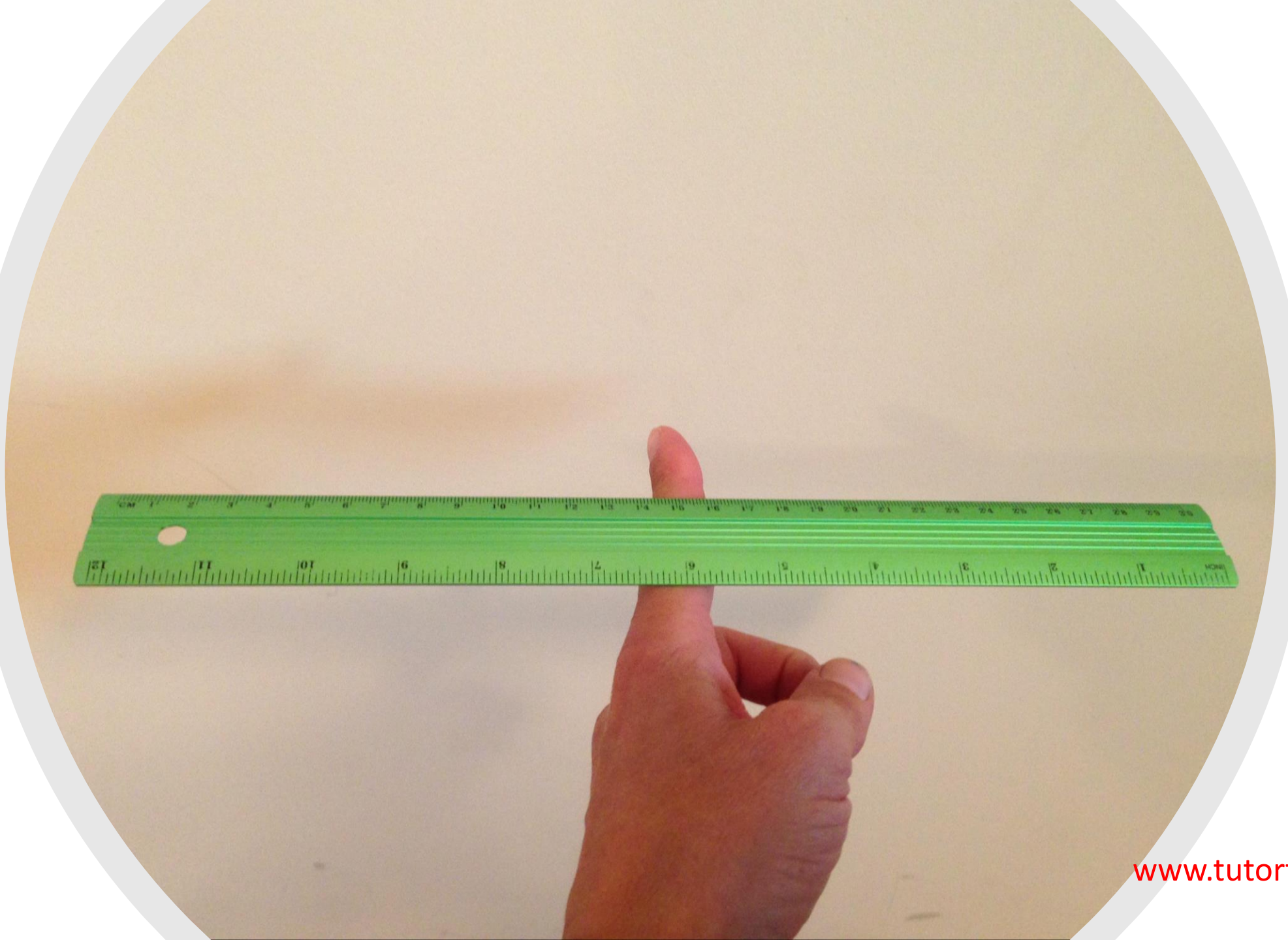

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Stability & centre of gravity

- Stability is a measure of how likely it is for an object to topple over when pushed or moved.
- Stable objects are very difficult to topple over, while unstable objects topple over very easily.
- An object will topple over if its centre of gravity is ‘outside’ the base, or edge, on which it balances.
- For an object to be stable it must have: a wide base a low centre of gravity

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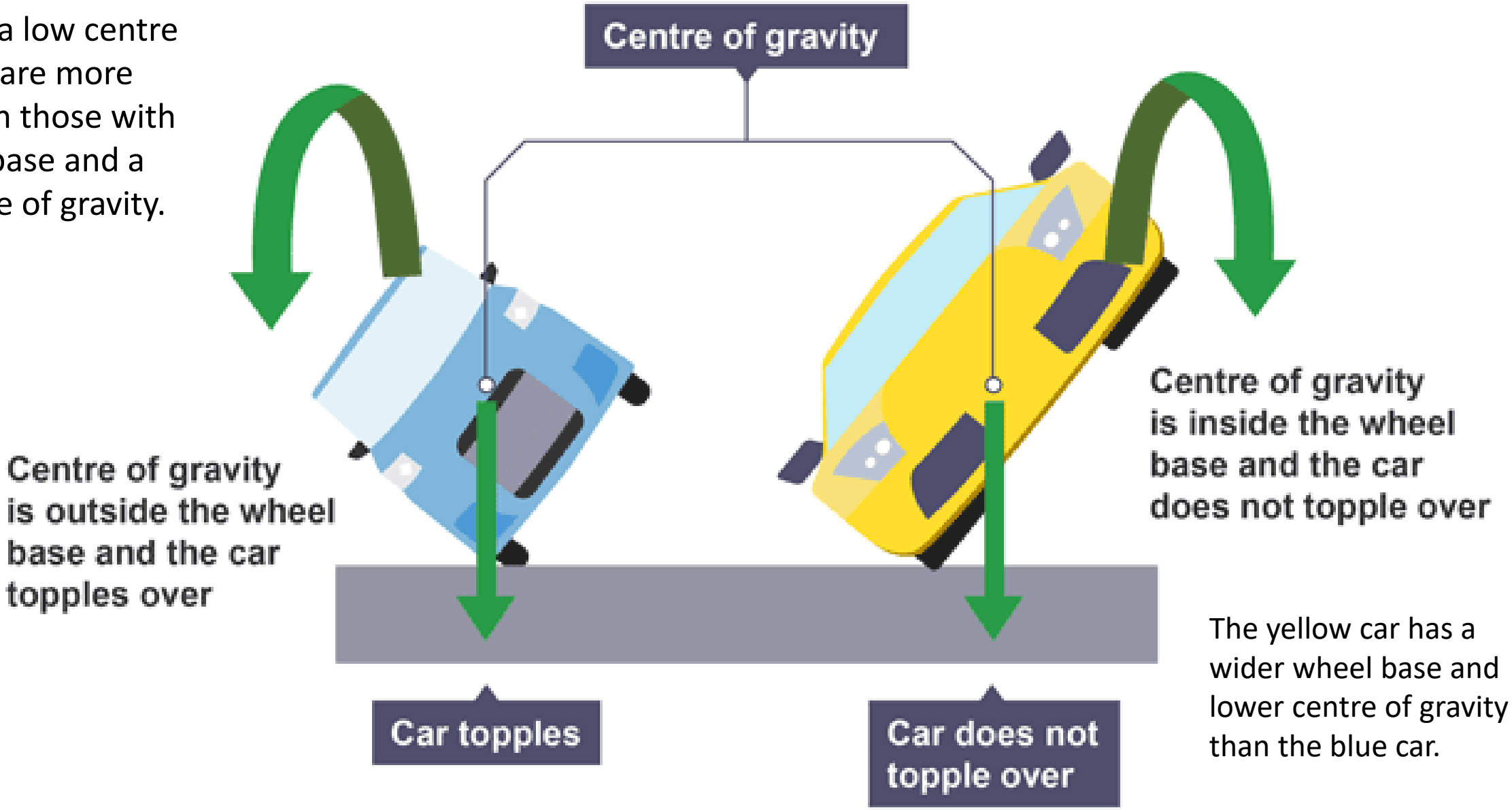
Objects with a wide base, and a low centre of gravity, are more stable than those with a narrow base and a high centre of gravity.



The yellow car has a wider wheel base and lower centre of gravity than the blue car.

It is more stable.

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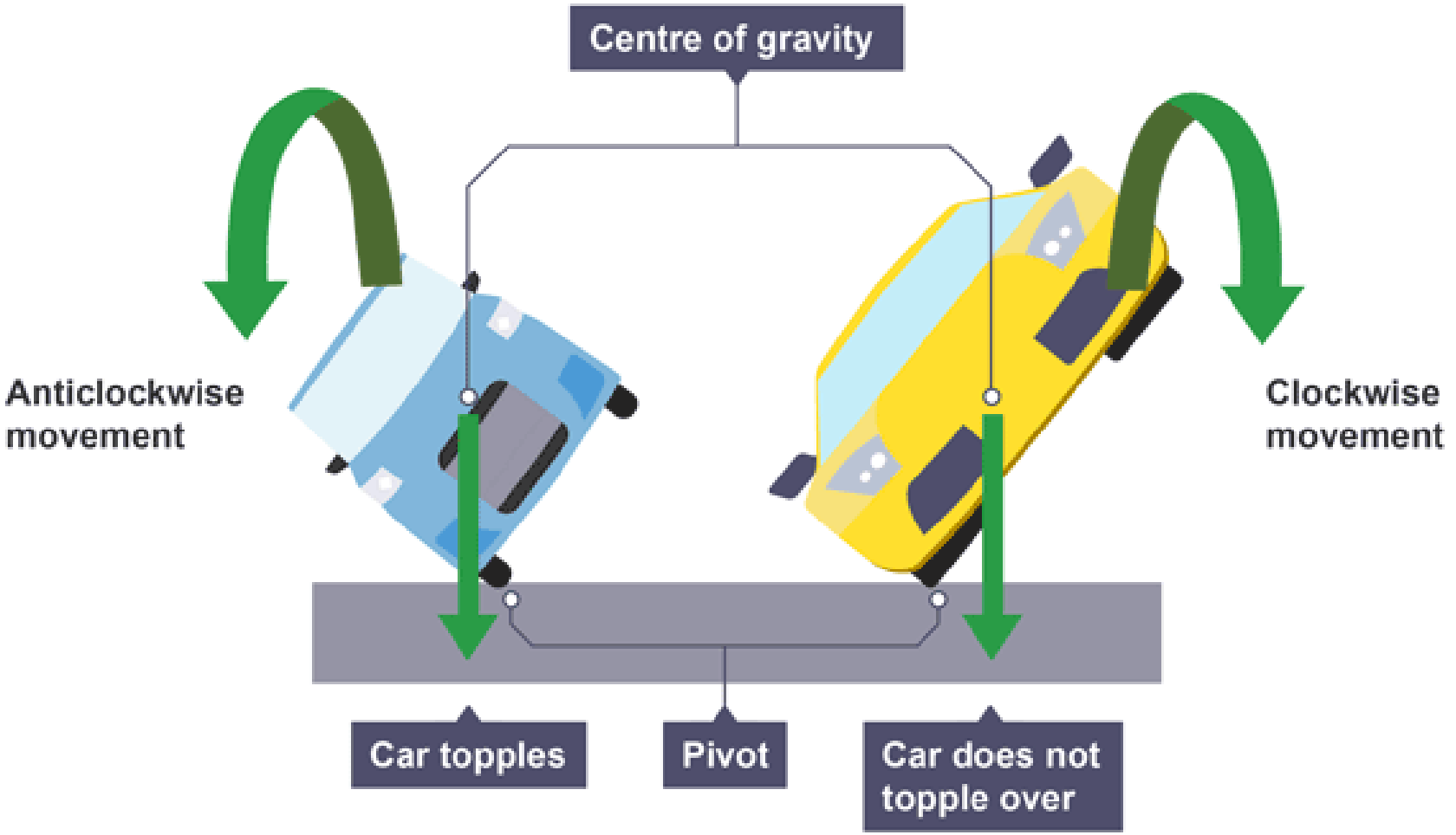

Car	Movement	Result
Blue	Anticlockwise	Topples over
Yellow	Clockwise	Falls back onto its base and does not topple over

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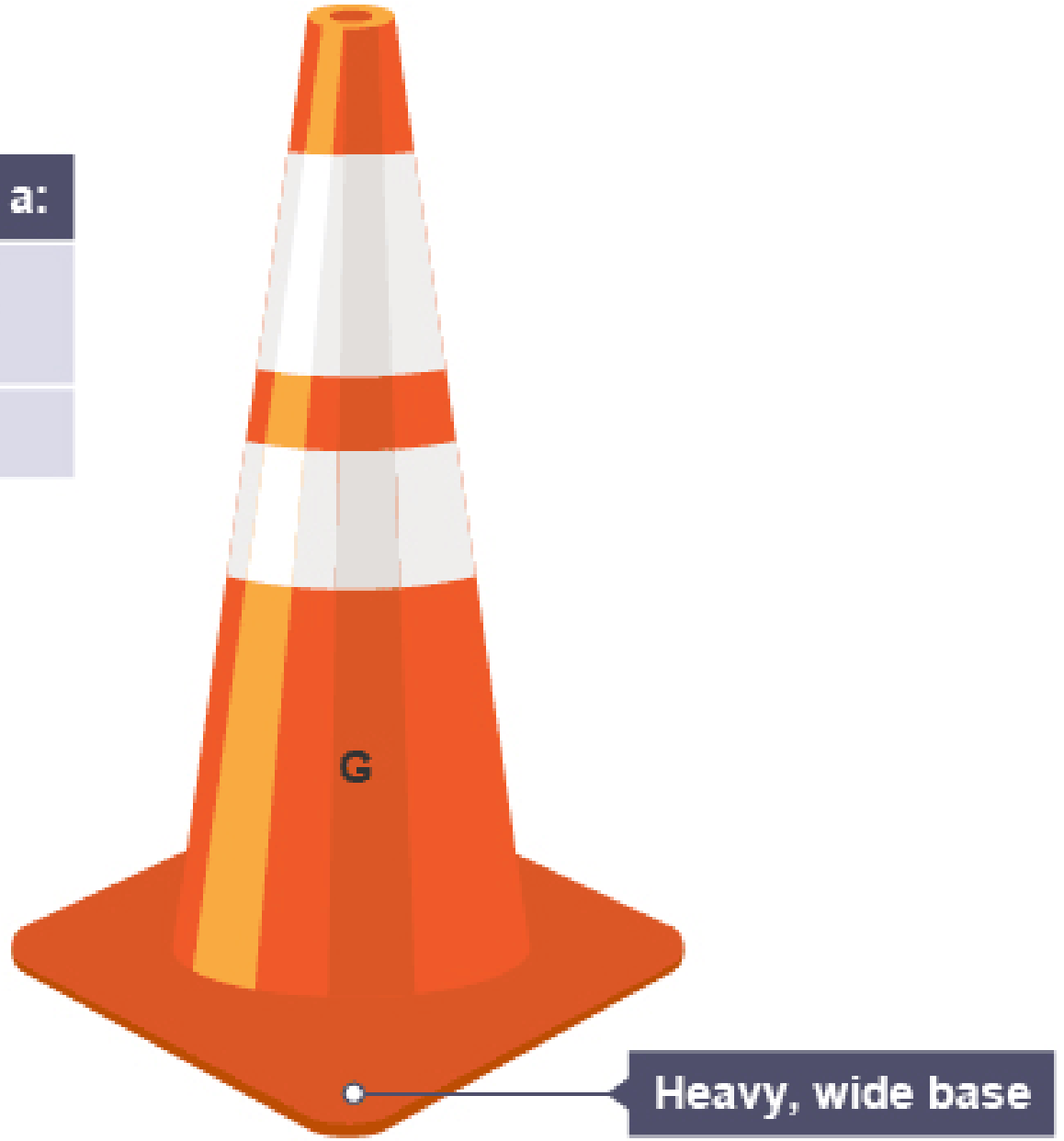
A traffic cone is a stable as it has a:
Low centre of gravity G because of its heavy base
Wide base



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End of Unit-1

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