a place of mind

FACULTY OF EDUCATION

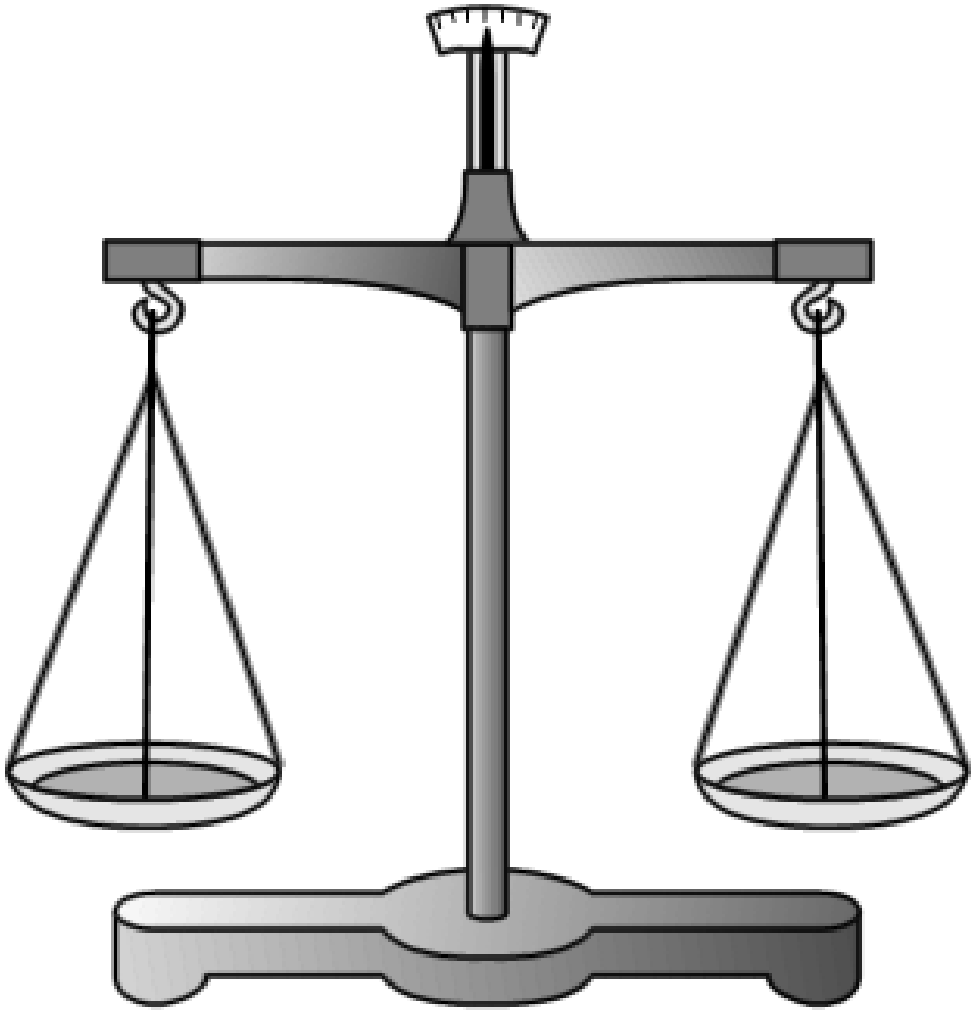
Department of
Curriculum and Pedagogy

Mathematics
Shape and Space:
Measurement (Mass)

Science and Mathematics Education Research Group

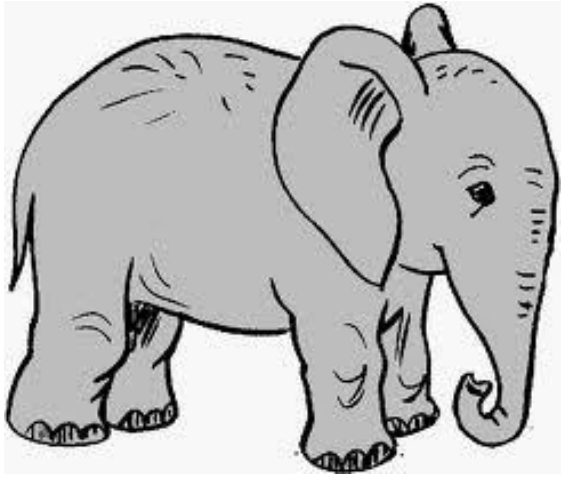
Supported by UBC Teaching and Learning Enhancement Fund 2012-2014

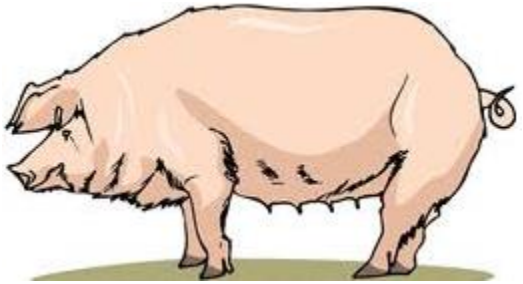
Measurement: Mass

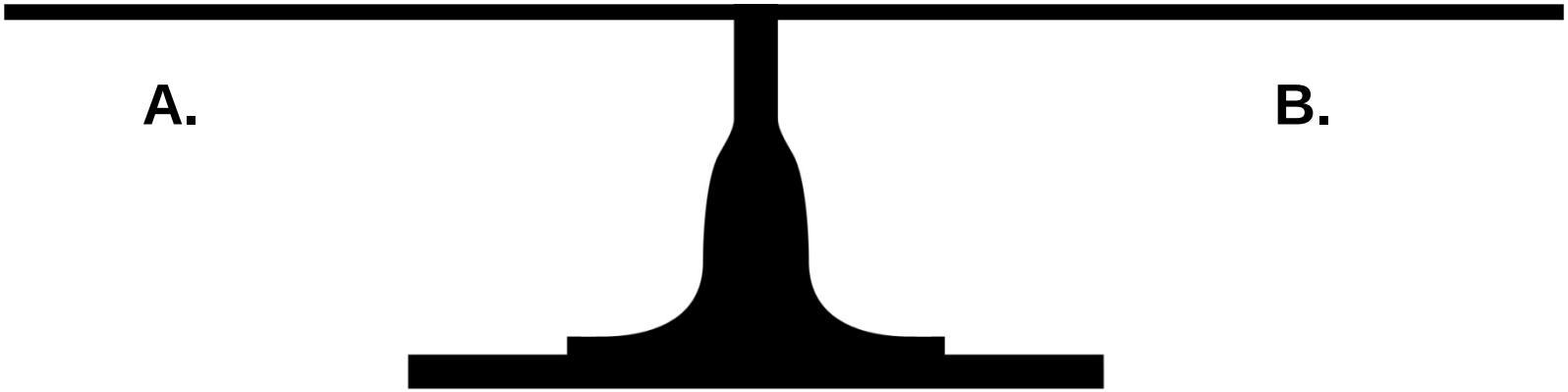


Measurement: Mass I

Which is **lighter**?







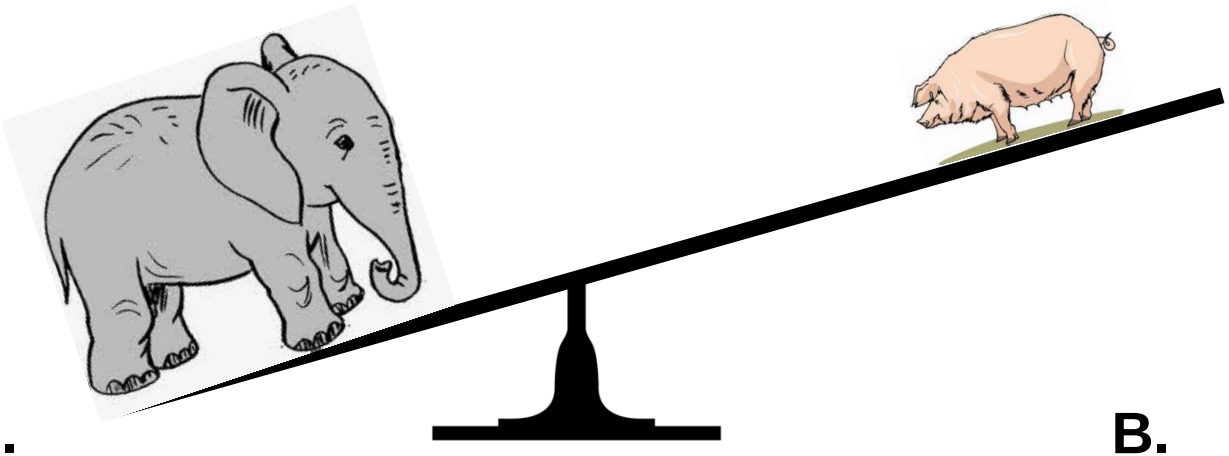
A.

B.

Solution

Answer: B

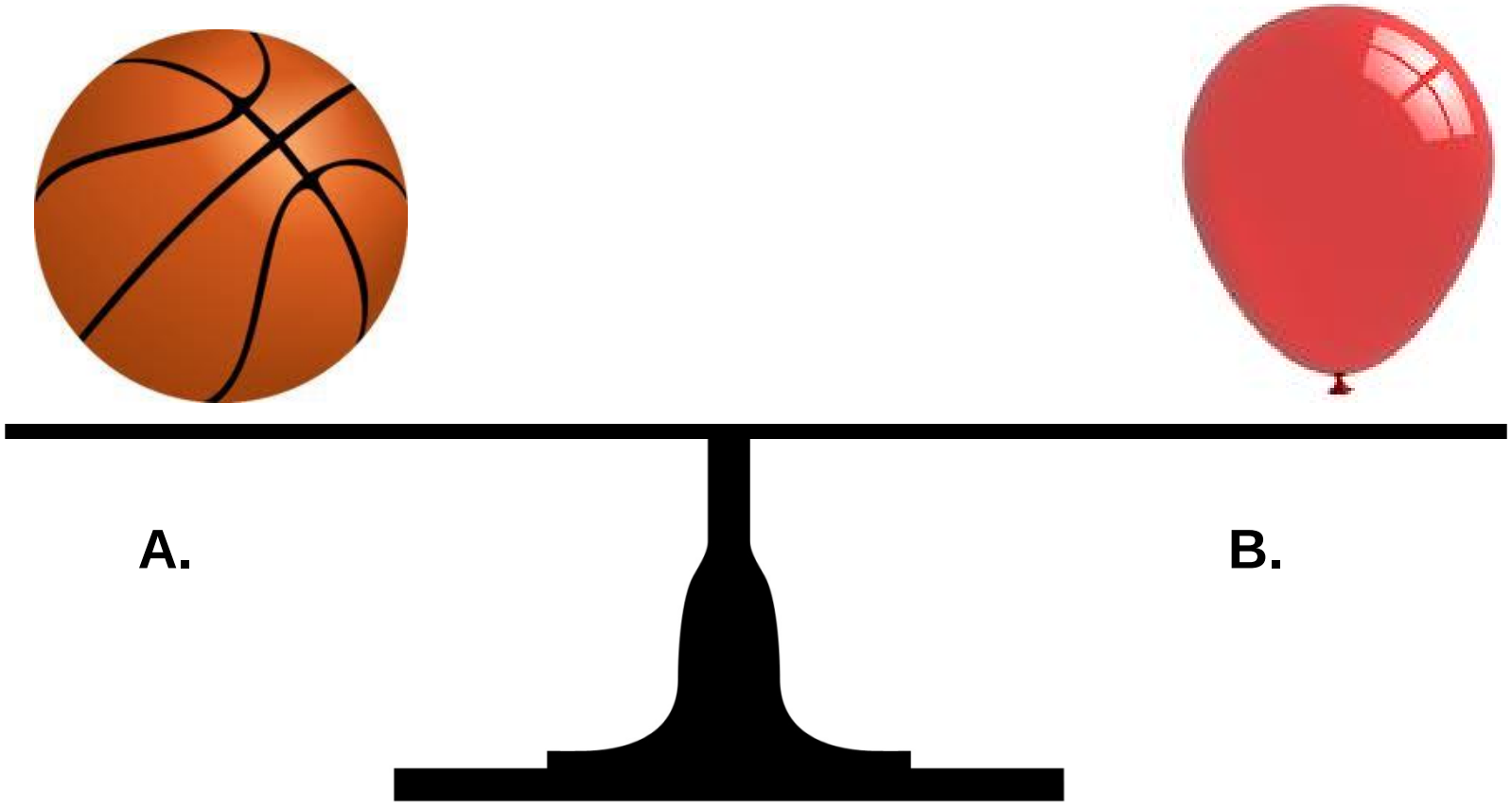
Justification: On average, an elephant weighs about several thousand kilograms and a pig weighs about 65 kilograms. Several thousand kilograms is greater than 65 kilograms. Therefore, the pig is lighter, and not heavier, than the elephant.



A. **B.**

Measurement: Mass II

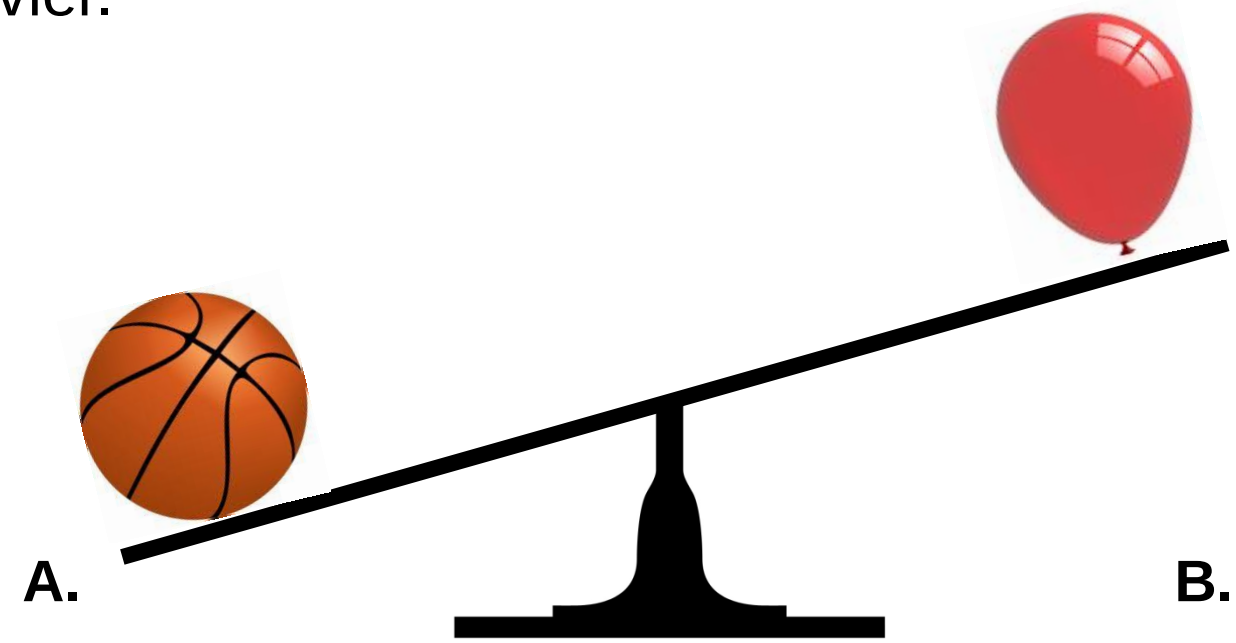
Which is **heavier**?



Solution

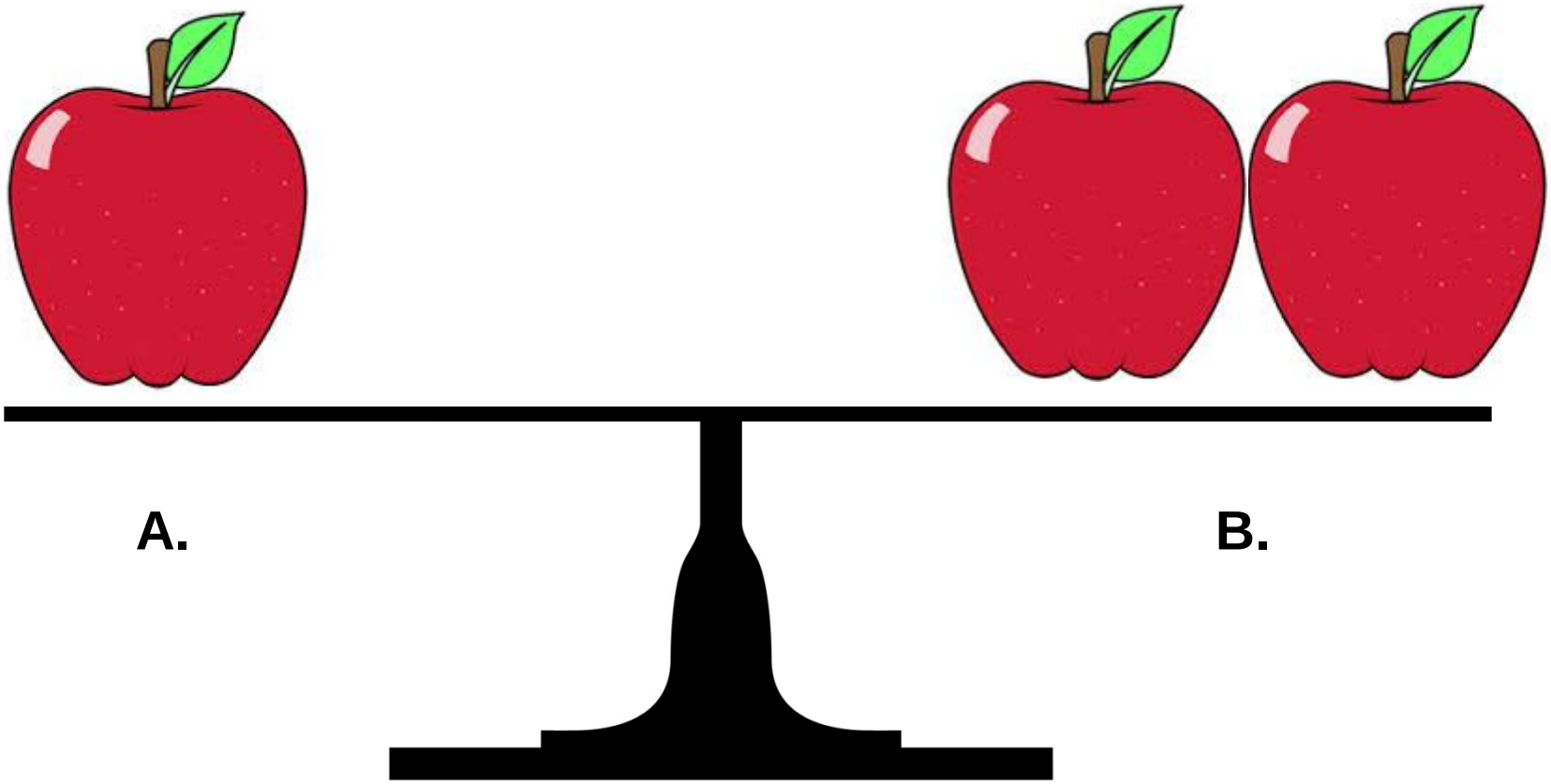
Answer: A

Justification: Although the basketball and the balloon are both about the same size, the basketball is more dense than the balloon. Therefore the basketball is heavier.



Measurement: Mass III

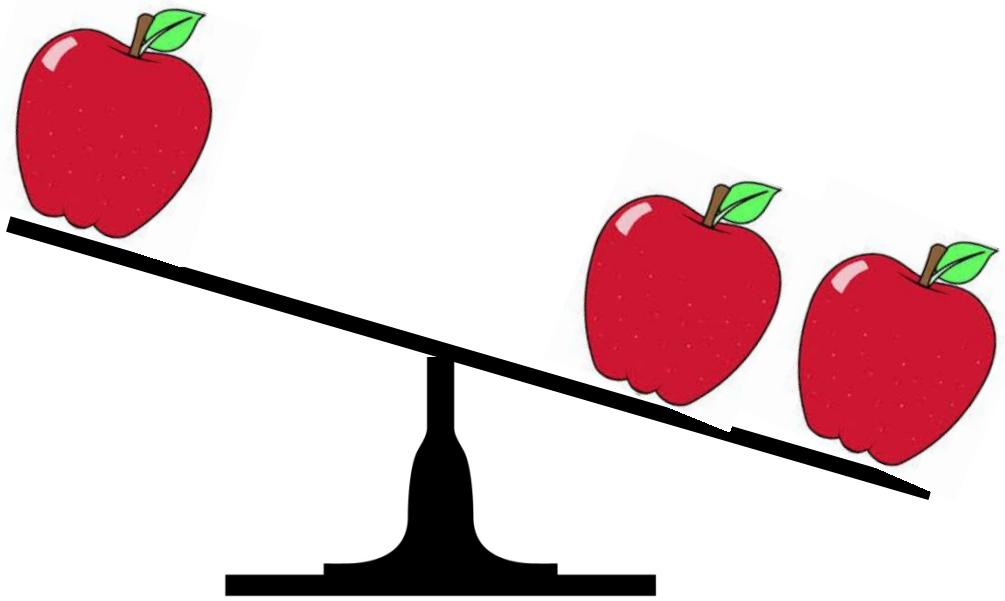
Which is **heavier**? Explain your answer.



Solution

Answer: B

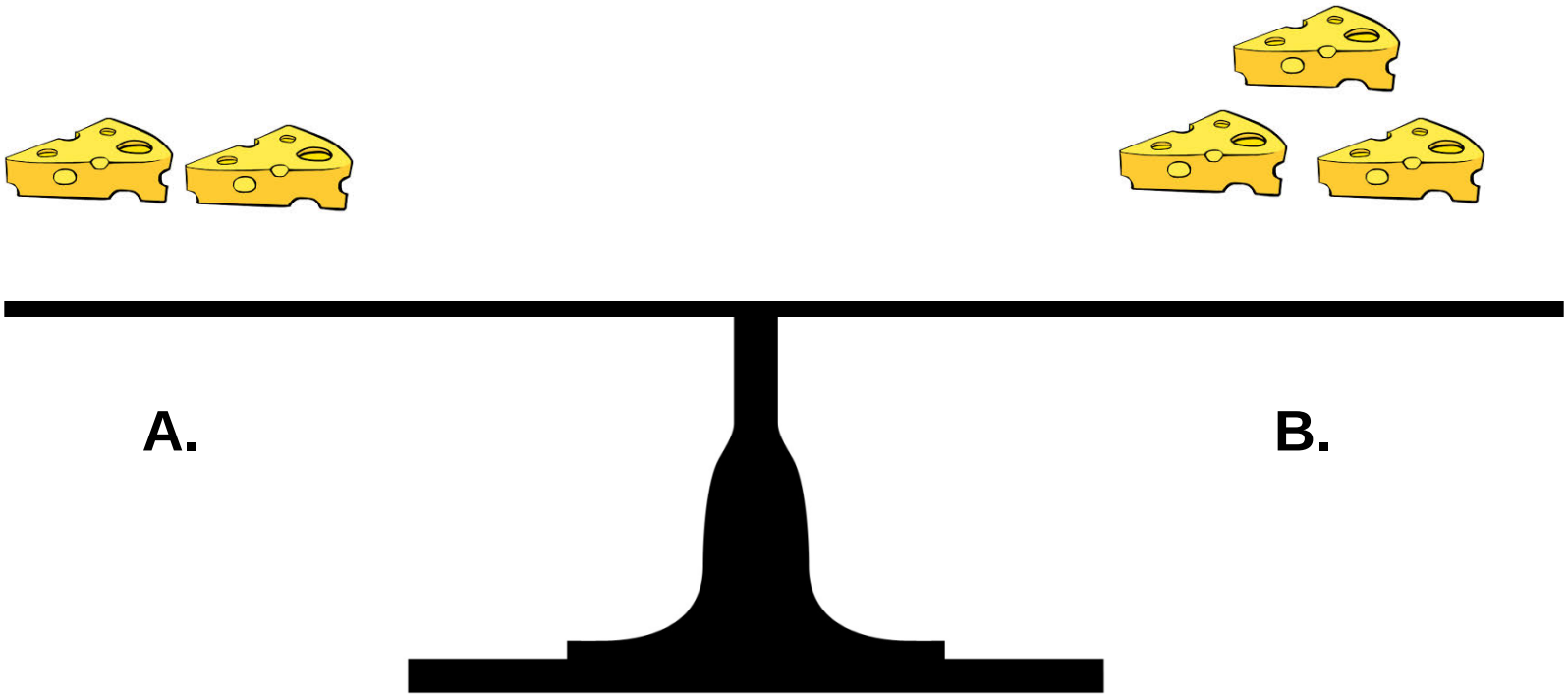
Justification: To answer, you must assume the apples weigh the same. Side A has 1 apple and Side B has 2 apples. Since 2 is greater than 1, Side B is heavier, and not lighter, than Side A.



A. **B.**

Measurement: Mass IV

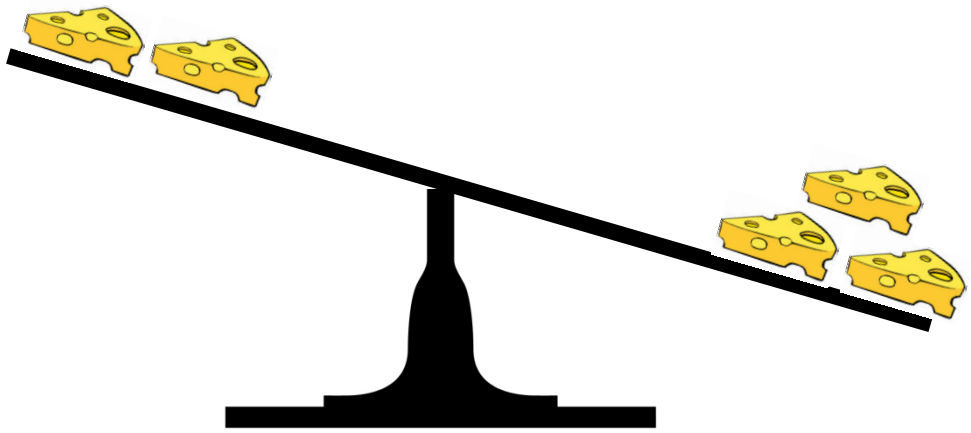
Which is **lighter**? Explain your answer.



Solution

Answer: A

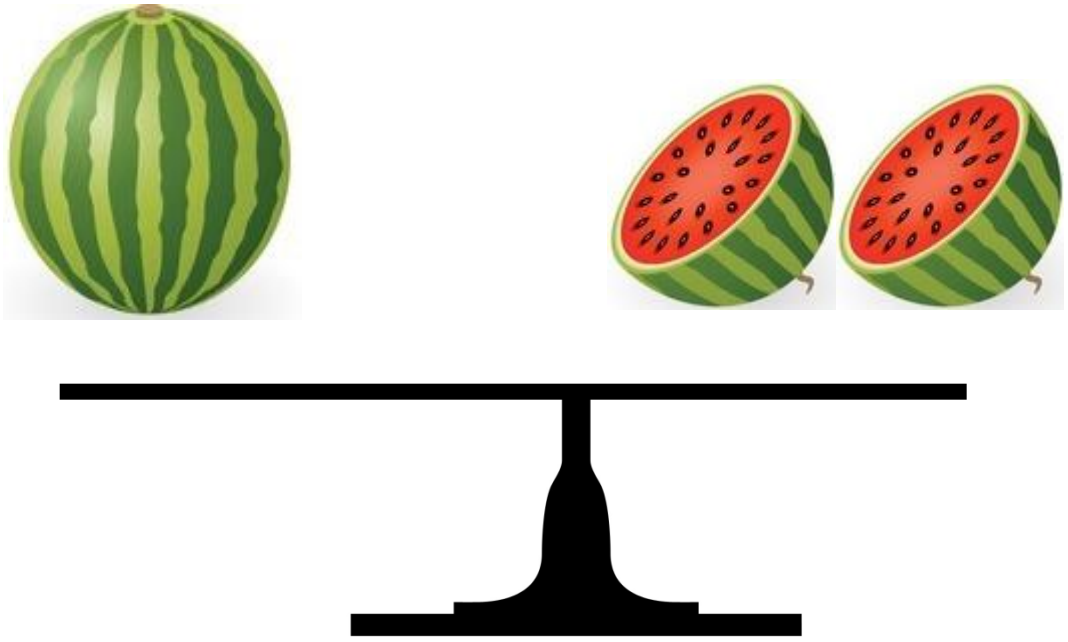
Justification: To answer, you must assume each piece of cheese weighs the same. Side A has 2 pieces of cheese and Side B has 3 pieces of cheese. Since 2 is less than 3, Side A is lighter, and not heavier, than Side B.



A. **B.**

Measurement: Mass V

A whole watermelon weighs _____ two halves of a watermelon.



A. heavier than

B. lighter than

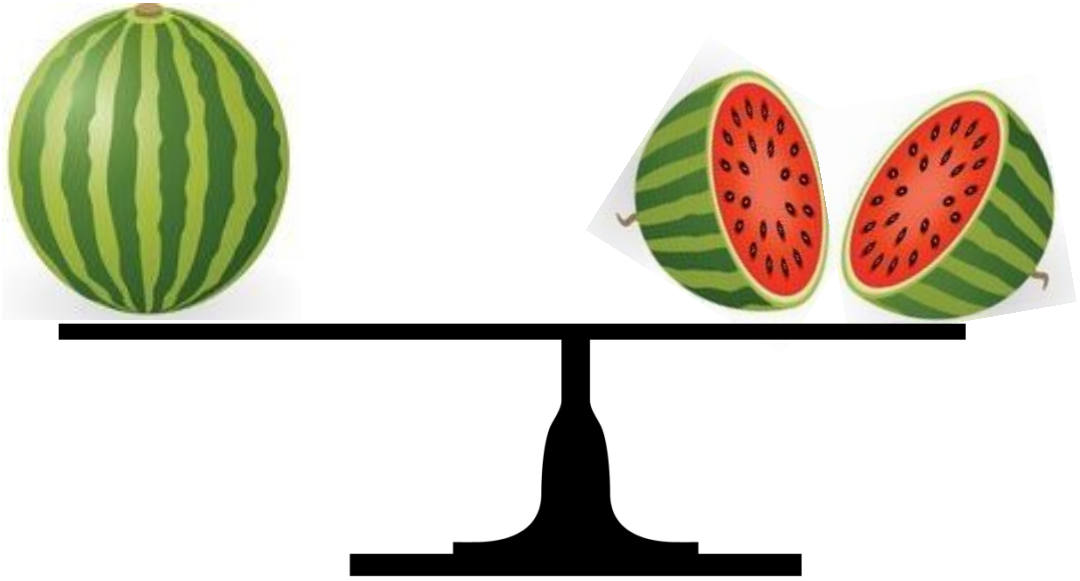
C. almost the same as

Solution

Answer: C

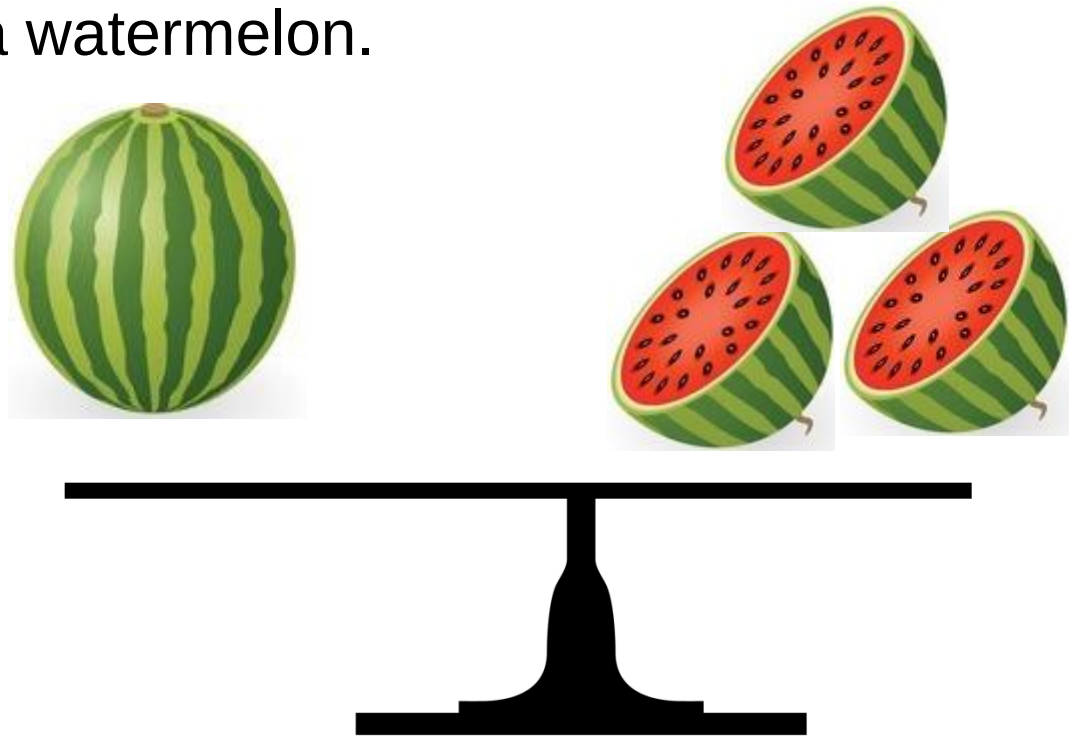
Justification: Two halves put together are about the same as one watermelon.

Note: It may not be exactly the same because watermelon sizes vary or the cutting may not be exactly in half



Measurement: Mass VI

A whole watermelon weighs _____ 3 halves of a watermelon.



A. heavier than

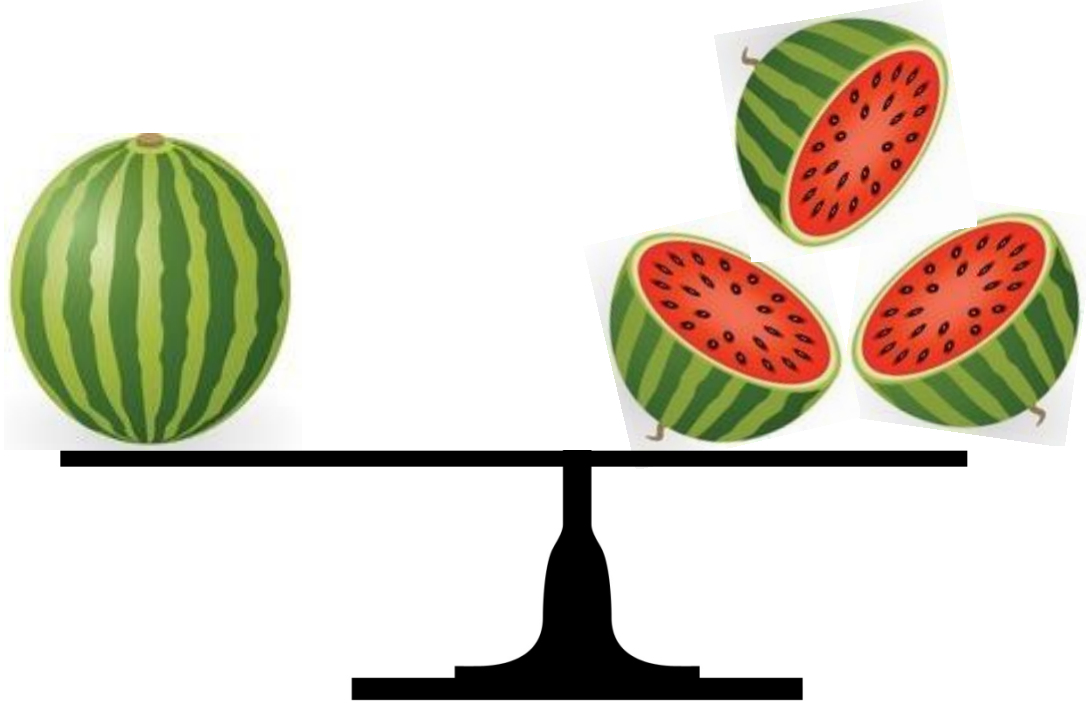
B. lighter than

C. almost the same as

Solution

Answer: B

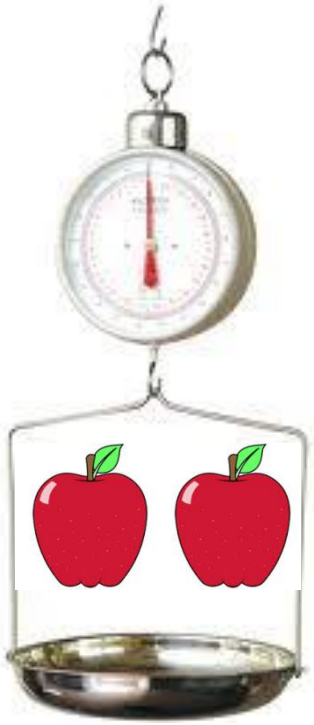
Justification: 3 halves of a watermelon equal to about one and a half watermelon. 1 is less than 1.5. Therefore, a whole watermelon weighs less than 3 halves of a watermelon.



Measurement: Mass VII

In which case will the scale show the larger reading (number)?

A.

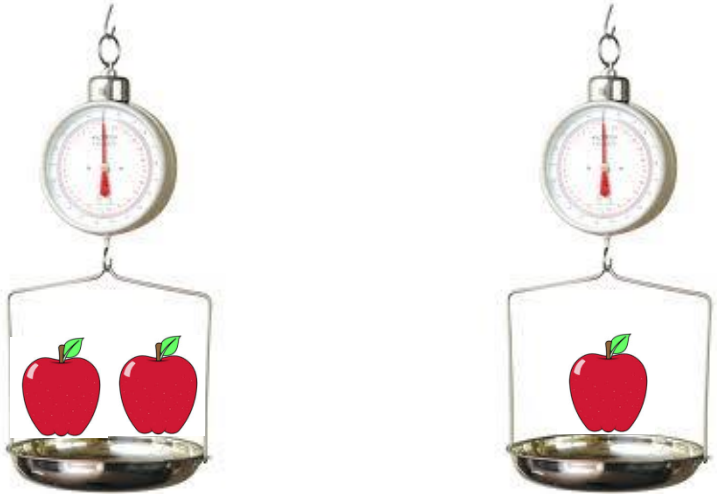


B.

Solution

Answer: A

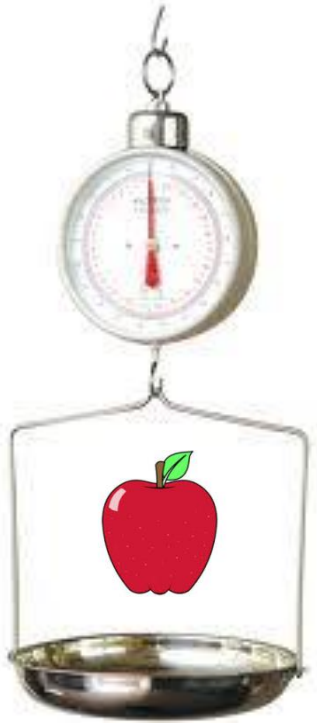
Justification: To answer, you must assume each piece of cheese weighs the same. Side A has 2 apples and Side B has 1 apple. Since 2 is greater than 1, Side A is heavier than Side B. The heavier side, Side A, will show the larger reading.



Measurement: Mass VIII

In which case will the scale show the smallest reading (number)?

A.



B.

C.

Solution

Answer: A

Justification: The order of the fruits from lightest to heaviest is strawberry, apple, and then watermelon. The strawberry is the lightest fruit. Therefore, the strawberry has the smallest reading (number) on the scale.

Measurement: Mass IX

In which case will the scale show the larger reading (number)?

A.

B.

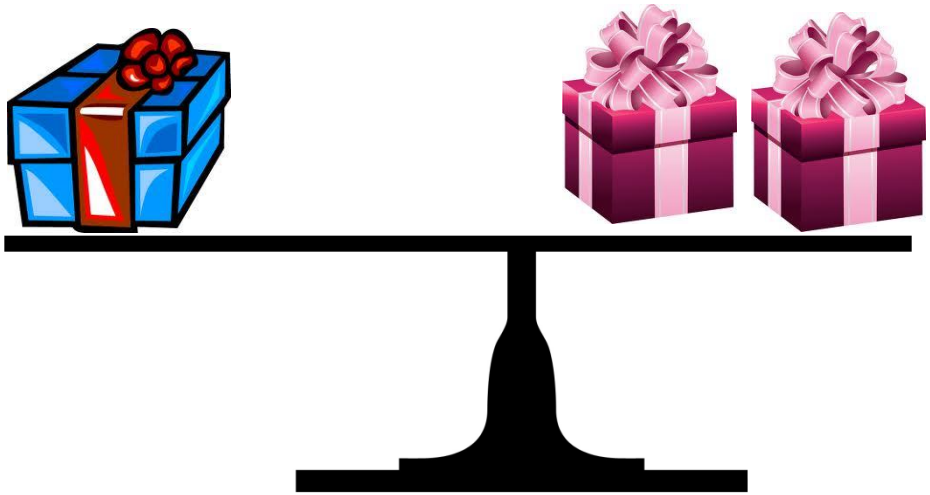
Solution

Answer: B

Justification: Scale A has 2 strawberries and Scale B has 1 watermelon. Although 2 items is greater than 1 item, 2 strawberries weighs much less than 1 watermelon. Therefore, the watermelon is heavier and would have a larger reading (number) on the scale.

Measurement: Mass X

If 1 blue present weighs almost the same as 2 pink presents, which present is **heavier**?



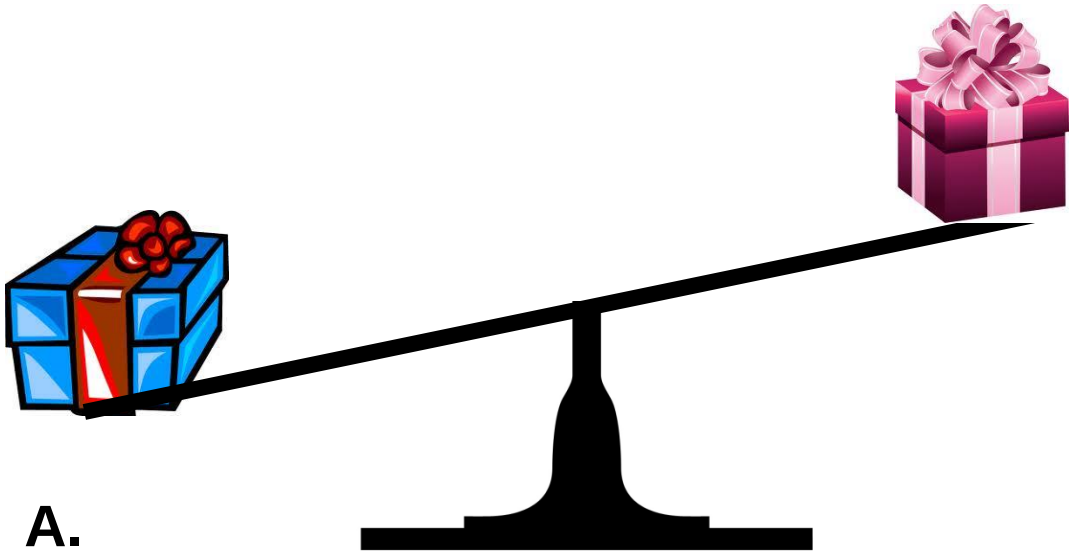
A. 

B. 

Solution

Answer: A

Justification: If 2 pink presents weigh about the same as 1 blue present, then each pink present weight half as much as each blue present. Therefore the blue present weighs more.



A. **B.**

Measurement: Mass XI

List in order from **heaviest to lightest**.

A.

B.

Solution

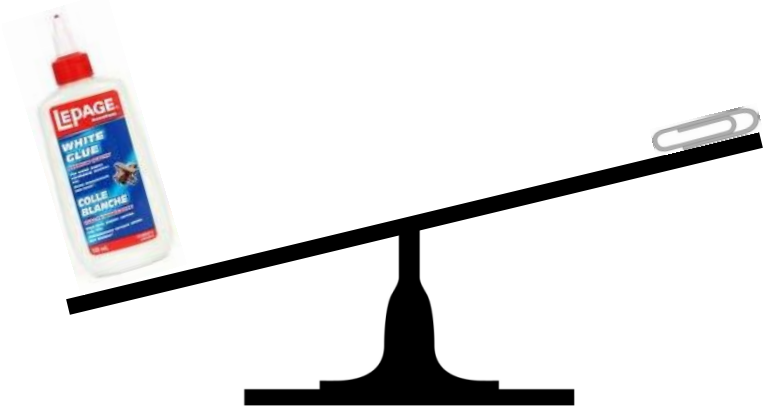
Answer: A

Justification: The objective is to put in order the objects from heaviest to lightest. A chair is the heaviest of all three items, so it must go first. A bottle of glue is heavier than a paper clip, so it must go second. Therefore the paper clip goes third.

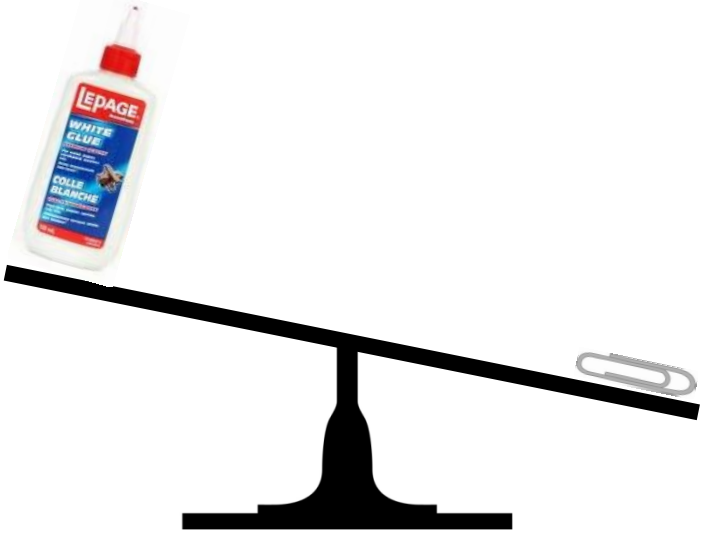
B.

Measurement: Mass XII

Which balance scale is correct? Explain your answer.



A.

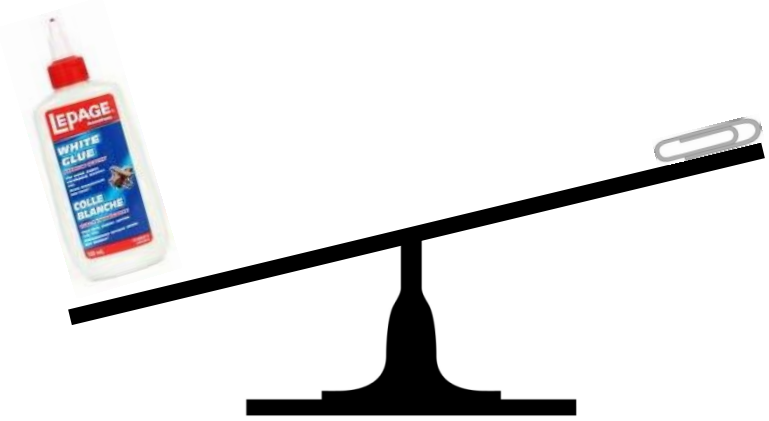


B.

Solution

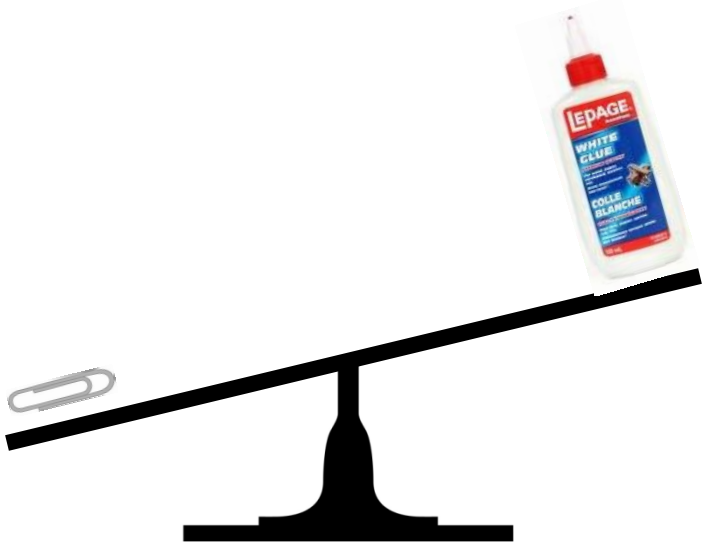
Answer: A

Justification: Heavier objects weigh down the scale, meaning they will push the scale down on the side they are set on. Therefore, the answer is A because a bottle of glue is heavier than a paperclip.



Measurement Mass XIII

Which balance scale is correct? Explain your answer.



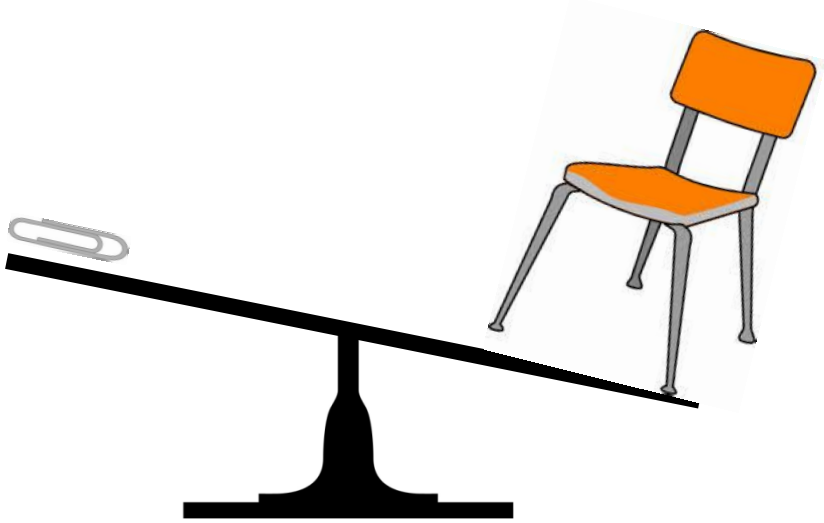
A.

B.

Solution

Answer: B

Justification: Heavier objects weigh down the scale, meaning they will push the scale down on the side they are set on. Therefore, the answer is B because chair is heavier than a paperclip and it must weigh down the side it is set on.



Measurement: Mass XIV

Which would be a reasonable estimation for the weight of the fruits?

A. 20 g

B. 2 kg

C. 20 kg

D. 200 kg

Units: g stands for grams and kg stands for kilograms

Solution

Answer: B

Justification: You can solve this question two ways:

Solution 1 – Find a reasonable option
Compare the mass of an unknown object to a known object. The fruit on the scale is approximately the same as a large bottle of pop (2 L). This makes 2 kg a reasonable estimation.

Solution 2 – Rule out unreasonable options
Are the other options reasonable? Consider, 20 grams is the weight of about 8 dimes, 20 kg is the weight of about two large bags of potatoes, and 200 kg is the weight of about a dolphin. The size and weight of the fruit on the scale is not comparable to these example, making them unreasonable.

Measurement: Mass XV

You helped your parents carry groceries home yesterday.

Which would be a reasonable weight of a heavy grocery bag?

A. 100 grams

B. 1 kg

C. 10 kg

D. 50 kg

Solution

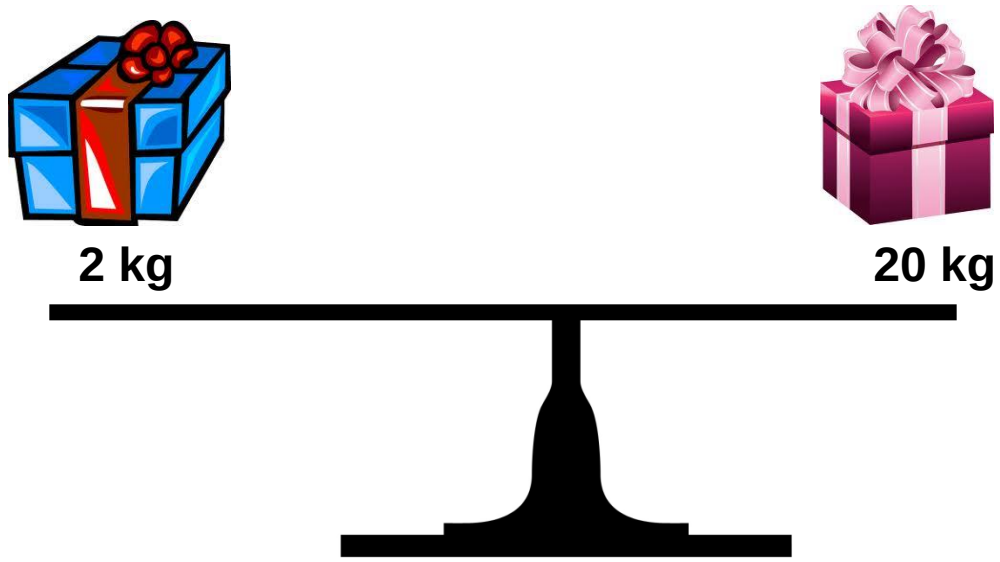
Answer: B

Justification: You can solve this question two ways:
Solution 1 – Find a reasonable option
Consider that an average 7 year old child weighs approximately 23 kg. Therefore 1 kg bag of groceries would feel heavy to them but still be manageable to carry.

Solution 2 – Rule out unreasonable options
Are the other options reasonable? Consider, 100 grams is the weight of about a few pieces of ham, 10 kg is about the weight of a large bag of potatoes, and 50 kg is much more than a weight of a child (as an average 7 year old weighs approximately 23 kg). Therefore, 1 kg is a relatively reasonable weight to carry.

Measurement: Mass XVI

Which present is heavier?



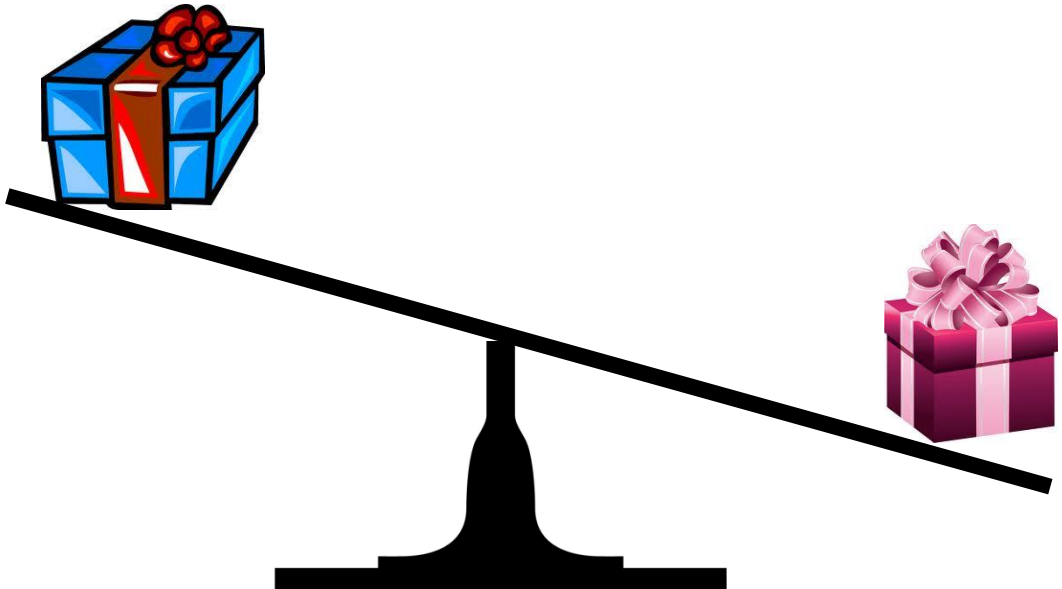
A. 

B. 

Solution

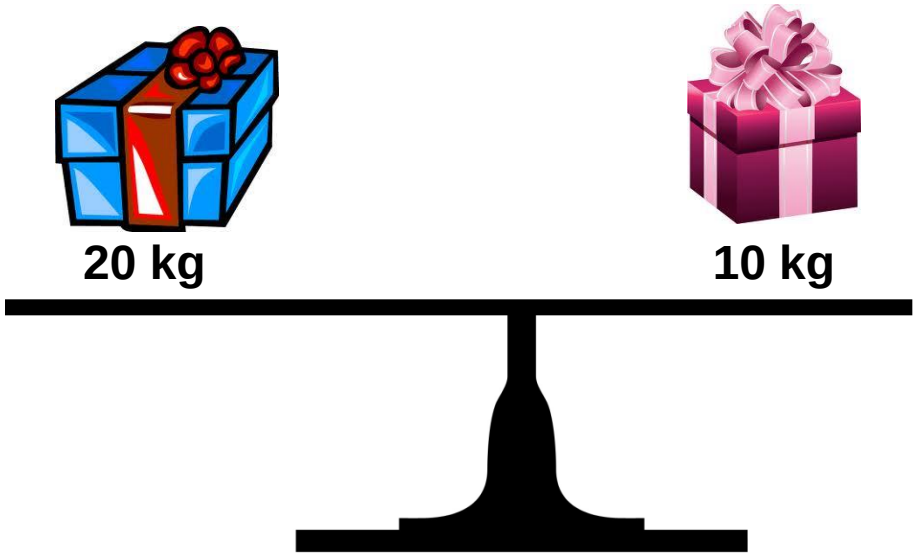
Answer: B

Justification: Heavier objects weigh down the scale, meaning they will push the scale down on the side they are set on. 20 is greater than 2. Therefore, 20 kg is heavier than 2 kg. This means B is correct because the pink present is heavier than the blue present.



Measurement: Mass XVII

Which present weighs less?



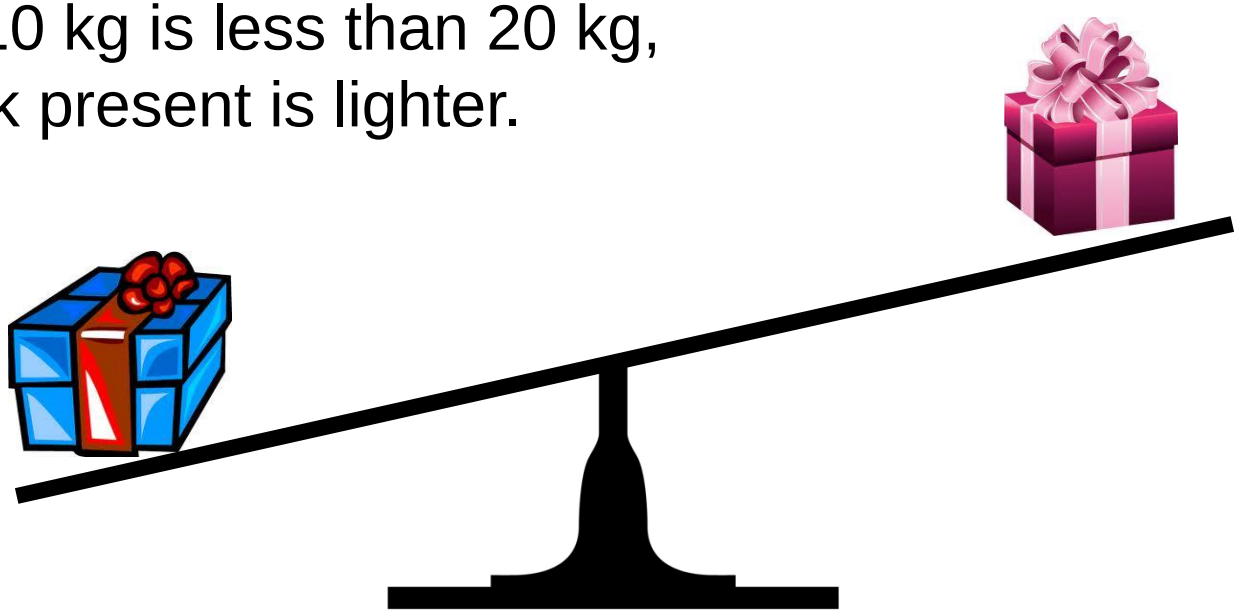
A. 

B. 

Solution

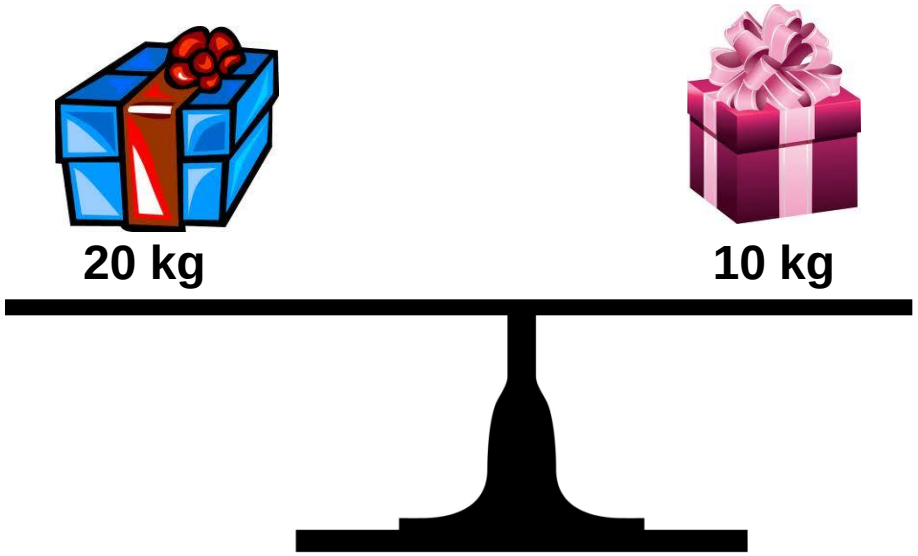
Answer: B

Justification: Heavier objects weigh down the scale, meaning they will push the scale down on the side they are set on and the other side will be raised. This means the lighter object will be on the raised side of the scale. Since 10 kg is less than 20 kg,
the pink present is lighter.



Measurement: Mass XIII

How many pink presents weigh the same as one blue present?



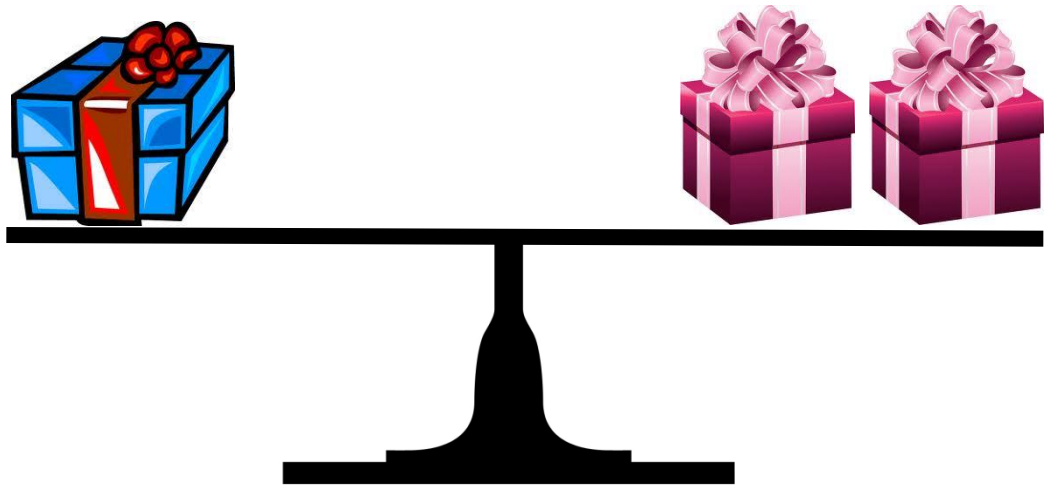
A. 

B. 

Solution

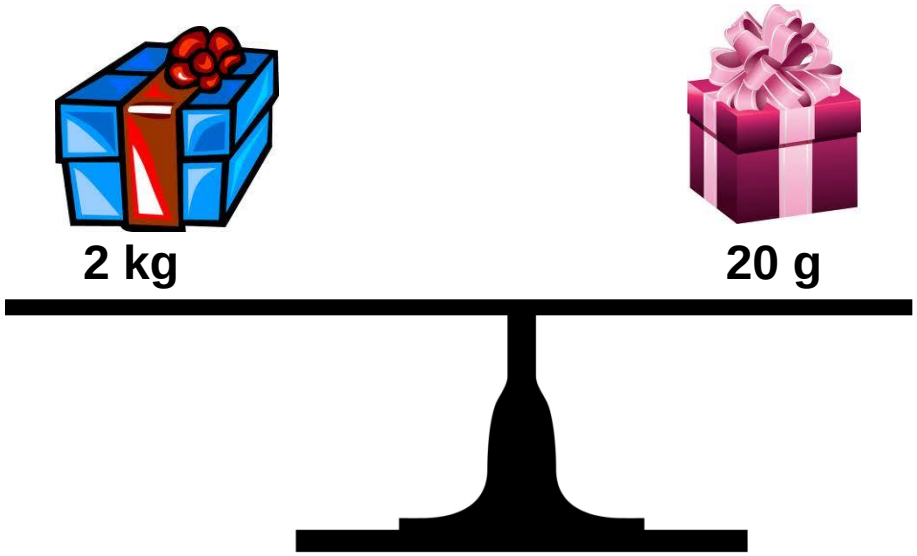
Answer: B

Justification: Two 10s make a 20. Therefore, the answer is B because two 10 kg pink gifts weighs the same as one 20 kg blue gift. It is not A because 10 kg does not equal 20 kg.



Measurement: Mass XIX

Which present weighs more?



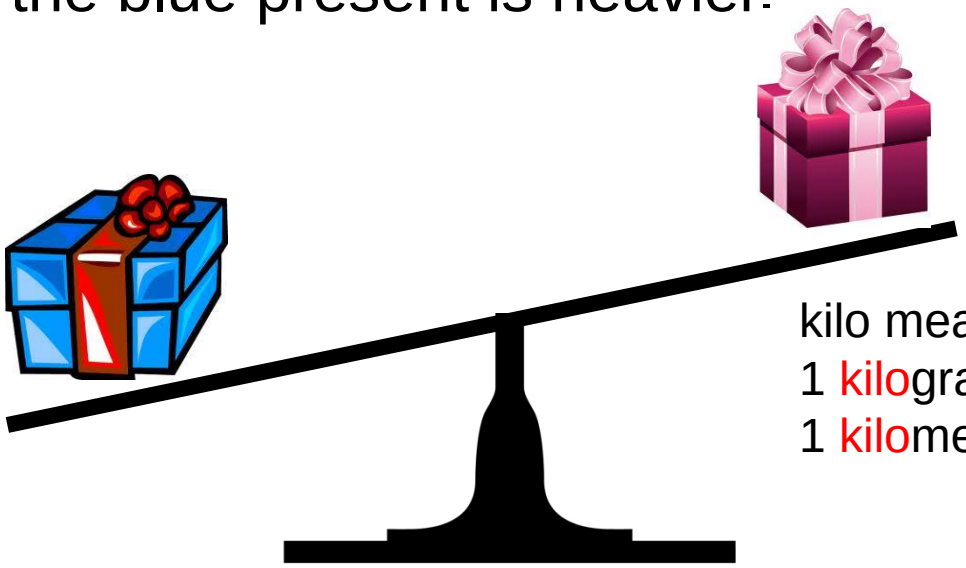
A. 

B. 

Solution

Answer: A

Justification: Although 20 is greater than 2, the units are not the same. If you convert the numbers into the same unit, the blue present is 2000 grams and the pink present is 20 grams. 2000 is greater than 20 and therefore the blue present is heavier.



kilo means 1000
1 kilogram means 1000 grams
1 kilometre means 1000 metres

Image References

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