

Demonstrations: Entertainment or Education?

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**NVC Meeting
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Modes of Presentation

- no demo
- present
- predict
- discuss



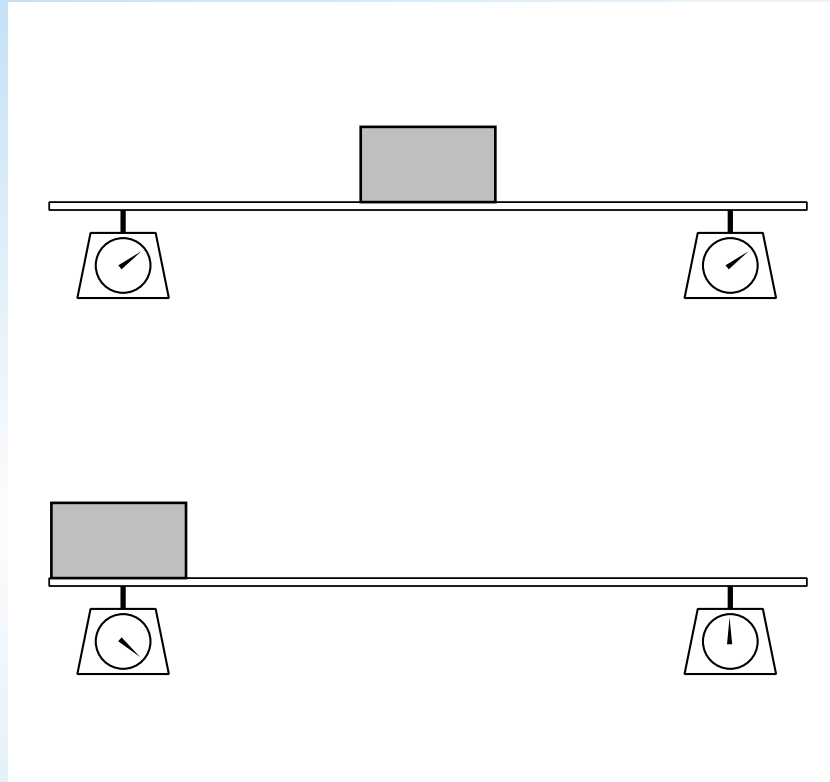
Follow-up

Web-based test (free response)

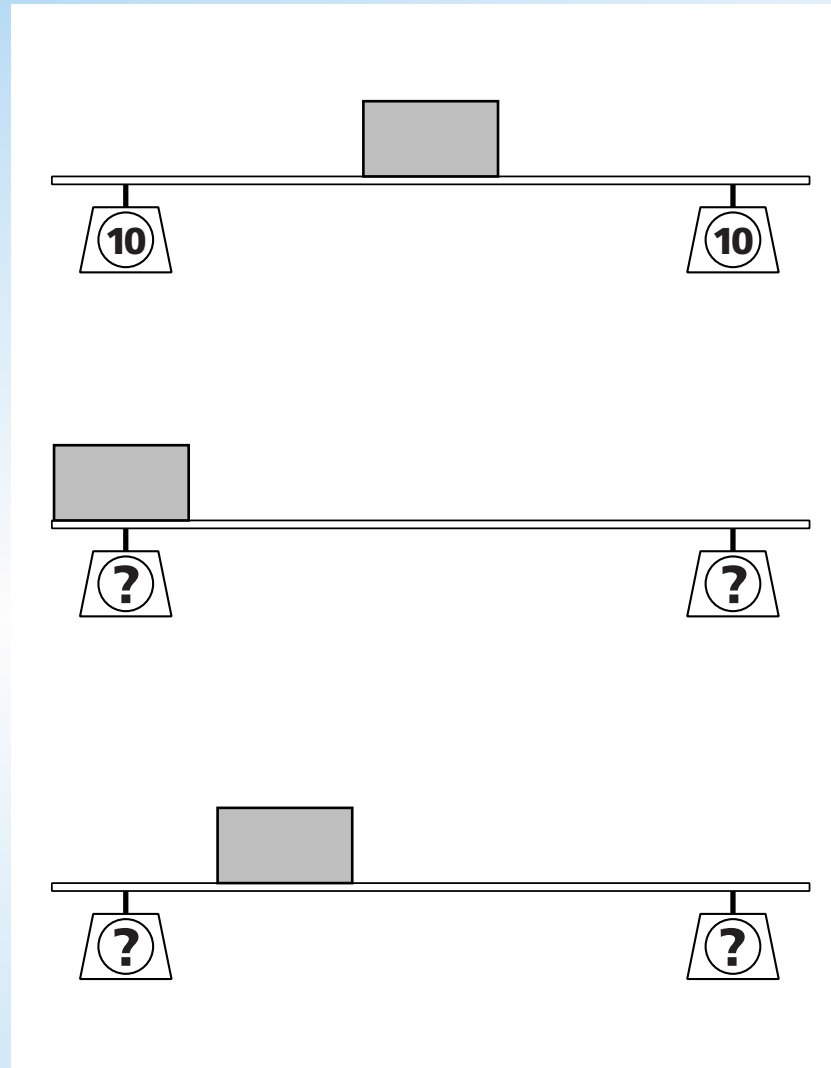
Final exam question



Loaded Beam Demo

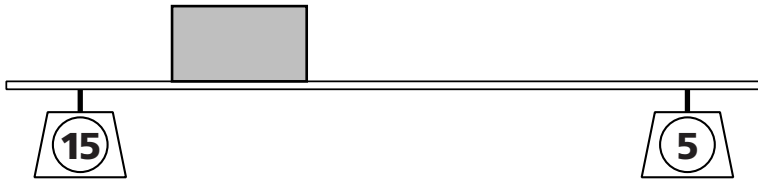
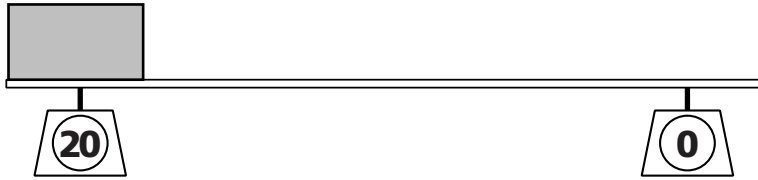


Web-based Test Question



Answers

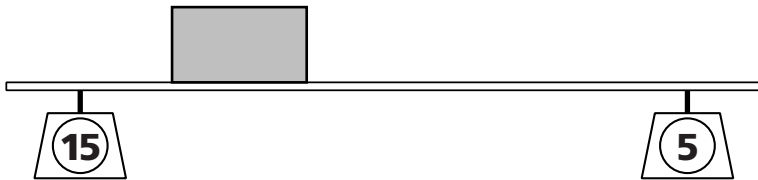
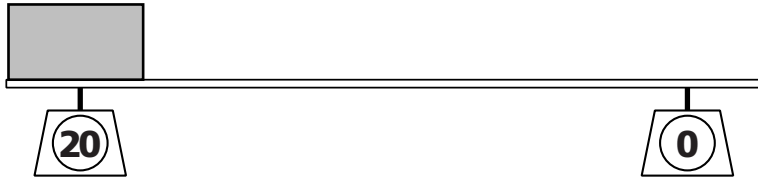
24% of students



correct (mentions torque)

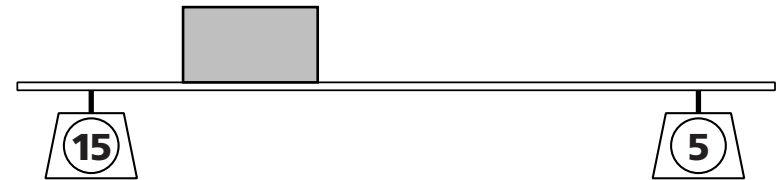
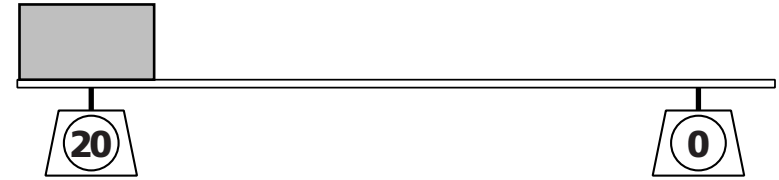
Answers

24% of students



correct (mentions torque)

38% of students

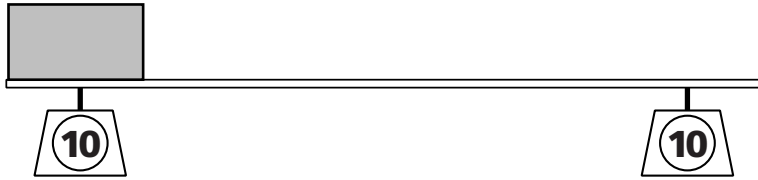


proportional reasoning

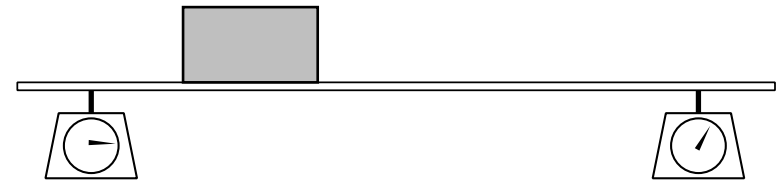
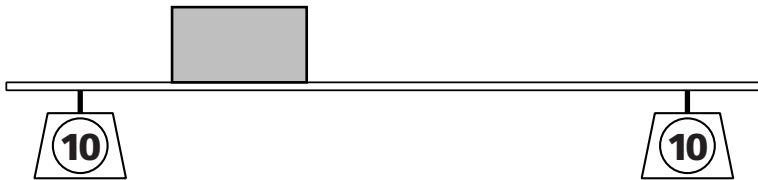
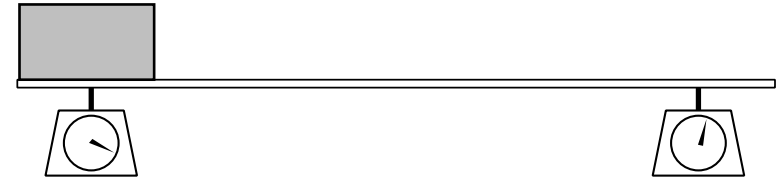


Answers

20% of students



10% of students



independent of position

qualitative reasoning

6% of students do not balance forces
2% give other incorrect answers



'Understanding' affects Memory

“As demonstrated in lecture, both scales will read 10N, regardless of where the center of mass is located. The platform and the metal block form one unit that is being measured, so the scales show two evenly distributed readings, no matter where the metal block is placed along the platform.”



Preliminary Analysis

| | correct | incorrect |
|----------------|----------------|------------------|
| no demo | 30% | 70% |
| present | 18% | 82% |
| predict | 29% | 71% |
| discuss | 30% | 70% |



Preliminary Analysis

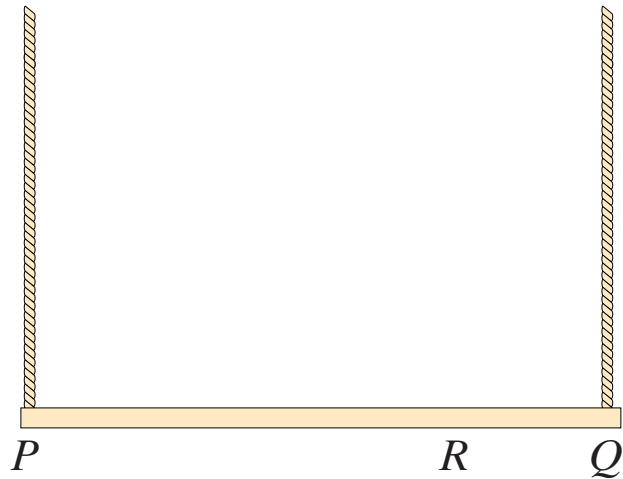
| | correct | incorrect |
|----------------|------------|------------|
| no demo | 30% | 70% |
| present | 18% | 82% |
| predict | 29% | 71% |
| discuss | 30% | 70% |

Just presenting harmful?



Exam Question

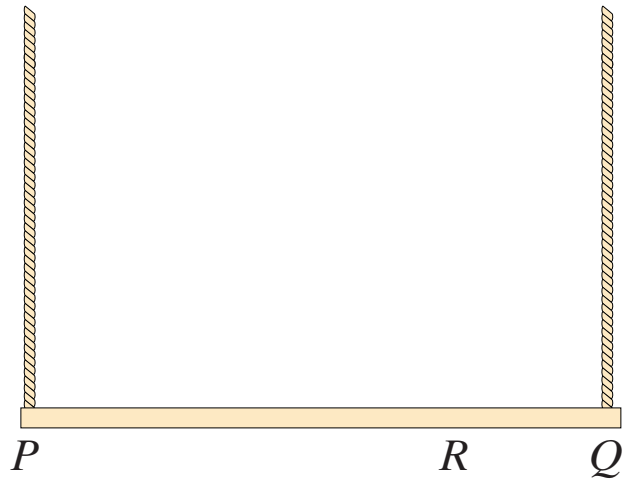
150 N



A uniform plank is supported by two ropes at points P and Q . The tension in the rope at P is 150 N. The point at which the other rope is attached to the plank is now moved to point R halfway between Q and the center of the plank. What are the tensions in the two ropes?

Correct Answer

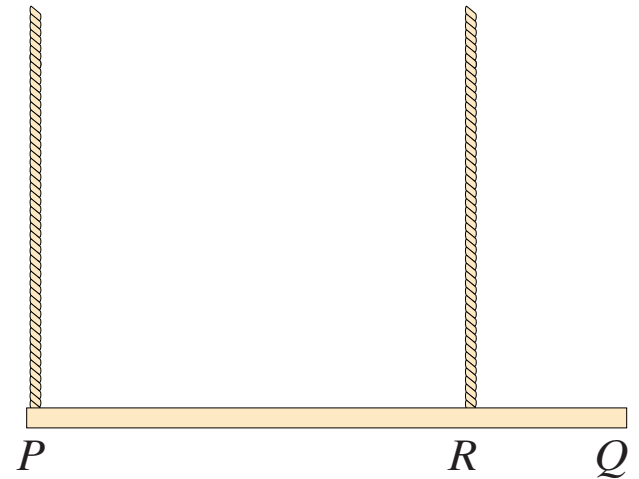
150 N



36% of students
(30% w. corr. reasoning)

100 N

200 N

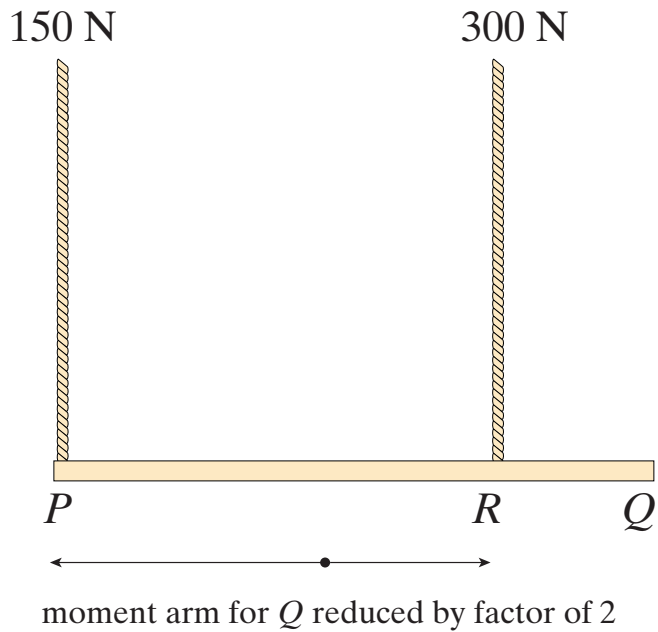


considerable improvement from web test

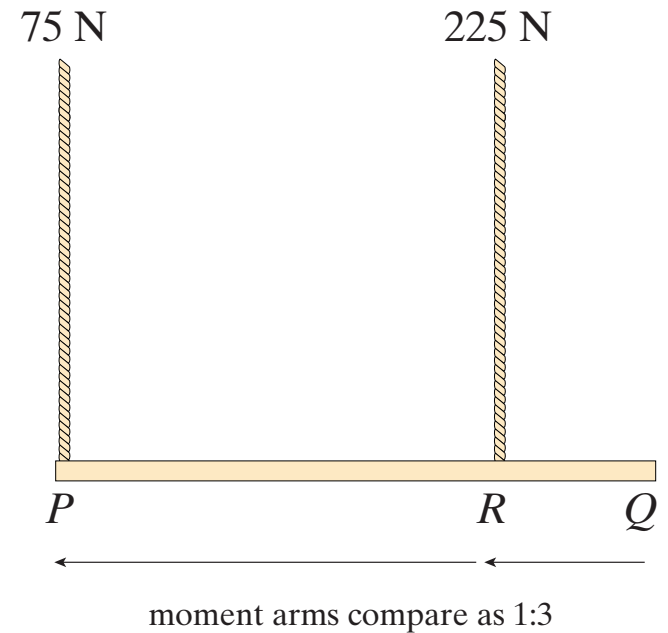


Incorrect Answers

13% of students



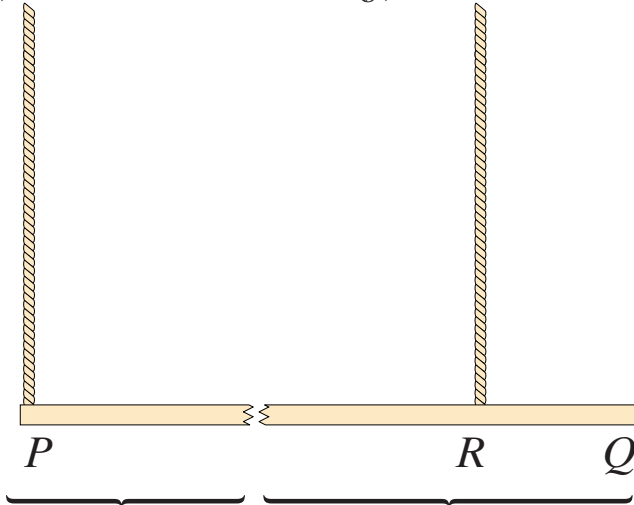
12% of students



Incorrect Answers

8% of students

$$\left(\frac{3}{8}\right) 300 \text{ N} = 112.5 \text{ N} \quad \left(\frac{5}{8}\right) 300 \text{ N} = 187.5 \text{ N}$$



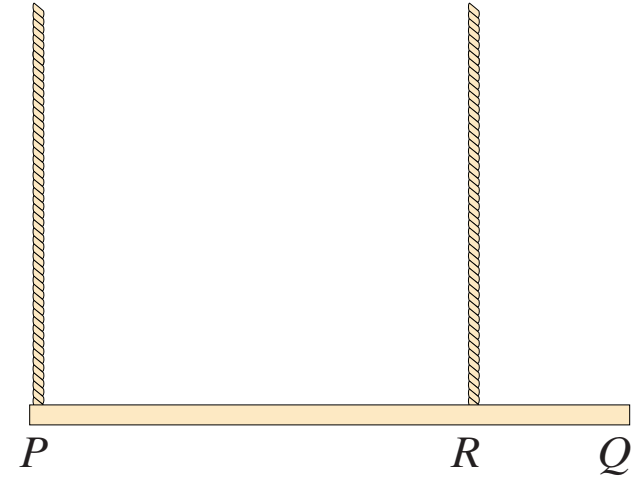
rope supports
 $\frac{3}{8}$ of the plank

rope supports
 $\frac{5}{8}$ of the plank

1% of students

112.5 N

112.5 N



ropes only need to support $\frac{3}{4}$ of plank



Analysis

| | correct | balances torques | no clear reasoning |
|----------------|----------------|-----------------------------|-------------------------------|
| no demo | 31% | 53% | 42% |
| present | 42% | 55% | 42% |
| predict | 41% | 65% | 32% |
| discuss | 46% | 85% | 15% |



Conclusion

Demonstration without engagement not very helpful

Much more data to be analyzed!

