

Worksheet: Hooke's Law



Question Video

Q1: In building a house, carpenters use nails from a large box. The box is suspended from a spring twice during the day to measure the usage of nails. At the beginning of the day, the spring stretches 50 cm. At the end of the day, the spring stretches 30 cm. What percentage of the nails have been used?

A 43%

B 55%

C 40%

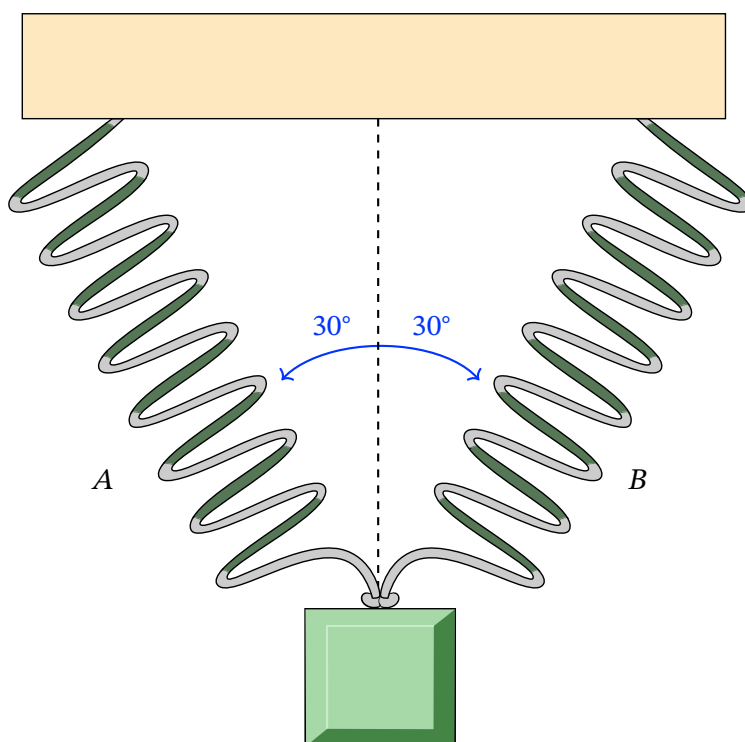
D 51%

E 48%

Q2: Two identical springs, each with the spring constant 20 N/m, support a 15.0 N weight, as shown.



Question Video



► What is the tension in spring *A*?

A 5.5 N

B 7.1 N

C 10 N

D 8.7 N

E 9.5 N

► What is the amount of stretch of spring *A* from the rest position?

A 0.50 m

B 0.47 m

C 0.40 m

D 0.43 m

E 0.45 m

Q3: A man with a mass of 80.0 kg stands on a pogo stick, compressing the spring in the stick by 0.120 cm. What is the spring's force constant?

A $6.53 \times 10^3 \text{ N/m}$

B $8.51 \times 10^3 \text{ N/m}$

C $7.87 \times 10^3 \text{ N/m}$

D $4.83 \times 10^3 \text{ N/m}$

E $9.73 \times 10^3 \text{ N/m}$

Q4: A set of scales obeys Hooke's law. The scales are depressed 0.75 cm by a load of 120 kg.

► What is the force constant of the scales?

A $1.8 \times 10^3 \text{ N/m}$

B $1.6 \times 10^3 \text{ N/m}$

C $1.3 \times 10^3 \text{ N/m}$

D $1.1 \times 10^3 \text{ N/m}$

E $2.0 \times 10^3 \text{ N/m}$

► When someone stands on the scales a depression of 0.48 cm is measured.

What is the person's mass?

A 82 kg

B 77 kg

C 75 kg

D 72 kg

E 86 kg

Q5: An object of mass 7.60 kg hangs from a spring that has a force constant of 425 N/m. Find the displacement of the lower end of the spring from its equilibrium position.

A 17.5 cm

B 7.50 cm

C 22.3 cm

D 19.5 cm

E 9.80 cm

Q6: An object of mass $m = 332 \text{ g}$ is suspended from a vertically hanging spring, causing the spring to extend by 4.89 cm . What extension of the spring would be produced by suspending an object with a mass of 505 g from it?

A 8.80 cm

B 2.55 cm

C 7.44 cm

D 3.87 cm

E 5.25 cm

Q7: The springs of a pickup truck act like a single spring with a force constant of $1.30 \times 10^5 \text{ N/m}$.

► By how much will the truck be depressed by its maximum load of $1.00 \times 10^3 \text{ kg}$?

A 5.12 cm

B 7.54 cm

C 9.60 cm

D 8.89 cm

E 2.64 cm

► If the pickup truck has four identical springs, what is the force constant of each spring?

A $5.02 \times 10^4 \text{ N/m}$

B $3.25 \times 10^4 \text{ N/m}$

C $7.21 \times 10^4 \text{ N/m}$

D $6.36 \times 10^4 \text{ N/m}$

E $4.29 \times 10^4 \text{ N/m}$

Q8: One type of BB gun uses a spring-driven plunger to blow the BB from its barrel. The plunger has a mass of 0.0750 kg and the maximum compression of the spring in the plunger is 0.24 m, which is sufficient for the plunger to reach a maximum speed of 27.3 m/s when it is released.

► Calculate the force constant of the plunger's spring.

A 310 N/m

B 970 N/m

C 31.0 N/m

D 25.0 N/m

E 850 N/m

► What force must be exerted to compress the spring?

A 7.5 N

B 230 N

C 1.40 N

D 6.10 N

E 210 N

Q9: Fish are hung on a spring scale to determine their mass. The spring is stretched 5.64 cm by a load of fish with a mass of 11.0 kg.

► What is the force constant of the spring in the scale?

A 1 910 N/m

B 608 N/m

C 5.23 N/m

D 60.8 N/m

E 19.1 N/m

► What is the mass of a fish that stretches the spring by 3.28 cm?

A 6.40 kg

B 2.03 kg

C 0.0175 kg

D 0.203 kg

E 0.0640 kg

► What is the distance between the half-kilogram marks on the scale?

A 2.56 mm

B 8.10 mm

C 9.37 mm

D 0.0800 mm

E 25.6 mm

Q10: A subway train with a mass of 355×10^3 kg travels 0.512 m as it decelerates to rest from a speed of 0.615 m/s. The train is decelerated by contact with a spring bumper. Find the spring constant of the bumper spring.

A 2.25×10^5 N/m

B 4.40×10^5 N/m

C 5.12×10^5 N/m

D 1.02×10^5 N/m

E 3.56×10^5 N/m

Q11: A spring has a length of 0.610 m when an object of mass 0.267 kg is suspended from it. The spring has a length of 0.812 m when an object of mass 2.33 kg is suspended from it.

► What is the force constant of the spring?

A 80.0 N/m

B 4.30 N/m

C 100 N/m

D 16.2 N/m

E 28.1 N/m

► What is the unloaded length of the spring?

A 0.333 m

B 0.449 m

C 0.584 m

D 0.372 m

E 0.517 m

Q12: What does Hooke's law state?

A Extension reaches a maximum after which fracture occurs.

B Fracturing is a gradual process that occurs in proportion to extension.

C Extension is proportional to tension.

D Extension varies as the square root of tension.

E Extension varies as the square of tension.