Springs and Hooke's Law

Forces and matter · 4 questions · step-by-step answers at the end

Name: Date: Score: / 4

USEFUL EQUATIONS

$F = ke$ $E = ½ke^2$

Questions

Show your working in the space under each question.

1. A spring with k = 200 N/m is stretched by 3.0 cm. What force is needed?

2. A 2.0 N load stretches a spring by 0.040 m. Find the spring constant and the energy stored when the extension is 0.10 m.

3. Two springs, each with k = 50 N/m, hang side by side and share a 6.0 N load. Find the extension.

4. A toy spring (k = 200 N/m) is compressed by 0.050 m and fires a 0.010 kg dart. Find the dart's speed.

Step-by-step answers

Springs and Hooke's Law

1. F = 200 × 0.030 = **6.0 N**.

2. 1. k = F/e = 2.0/0.040 = **50 N/m**.
   2. E = ½ke² = ½ × 50 × 0.10² = **0.25 J**.
   Answer: 50 N/m; 0.25 J

3. Combined k = 100 N/m, so e = 6.0/100 = **0.060 m**.

4. E = ½ × 200 × 0.050² = 0.25 J = ½mv², so v = √(2 × 0.25/0.010) = **7.1 m/s**.