

## 6 Deformation of solids – Part 1 — Answers

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### Answers

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**6.1**  $F = kx = 25 \times 0.20 = 5.0 \text{ N}.$

**6.2** Elastic: the material returns to its original shape when the force is removed. Plastic: it stays permanently deformed.

**6.3**  $\sigma = F/A = 32/(4.0 \times 10^{-7}) = 8.0 \times 10^7 \text{ Pa}.$

**6.4**  $\varepsilon = x/L = (2.0 \times 10^{-3})/2.5 = 8.0 \times 10^{-4}.$

**6.5**  $E = \sigma/\varepsilon = (8.0 \times 10^7)/(8.0 \times 10^{-4}) = 1.0 \times 10^{11} \text{ Pa}.$

**6.6**  $E = \frac{1}{2}kx^2 = \frac{1}{2}(25)(0.20^2) = 0.50 \text{ J}.$

**6.7** The longer wire stretches more. With the same force, area and material the *strain* (extension per unit length) is the same; but the actual extension is strain  $\times$  length, so the longer wire —having more length—extends about twice as much.