18 An object is displaced horizontally to the right in a uniform vertical gravitational field.

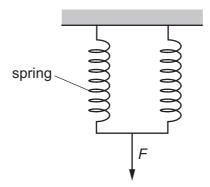
Which statement describes the change in the gravitational potential energy of the object?

- **A** It decreases in direct proportion to the displacement.
- **B** It does not change with the displacement.
- **C** It increases in direct proportion to the displacement.
- **D** It increases in direct proportion to the square of the displacement.
- **19** A copper wire of length 3.6 m and diameter 1.22 mm is stretched by a force of 37 N. The wire obeys Hooke's law. The Young modulus of copper is 1.17×10^{11} Pa.

Which extension is caused by this force?

- **A** 0.24 mm
- **B** 0.76 mm
- **C** 0.97 mm
- **D** 3.1 mm
- **20** A spring has spring constant k. The spring obeys Hooke's law and experiences extension x when a force F is applied to it. The resulting elastic potential energy of the spring is E_P .

The diagram shows two of these springs joined together in parallel and hanging from a fixed beam.



What is the extension and total elastic potential energy of this arrangement when the same force F is applied?

	extension	total elastic potential energy
Α	$\frac{1}{2}X$	½ E _P
В	$\frac{1}{2}X$	1/4 E P
С	x	$\frac{1}{2}E_{P}$
D	Х	$\frac{1}{4}E_{P}$