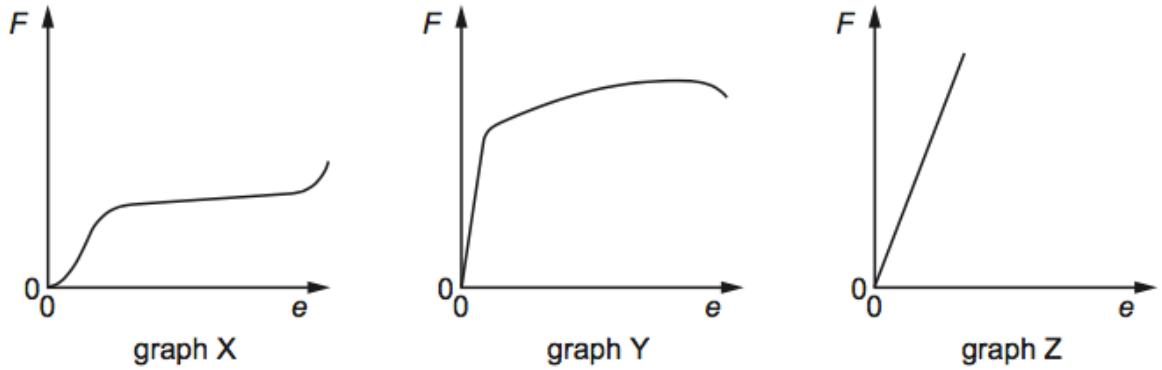
1)

Cylindrical samples of steel, glass and rubber are each subjected to a gradually increasing tensile force *F*. The extensions *e* are measured and graphs are plotted as shown below.

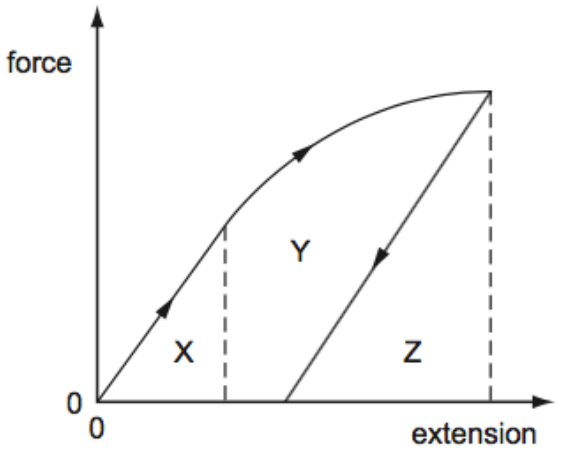


Which row correctly relates the graphs to the materials?

	steel	glass	rubber
A	X	Y	Z
B	X	Z	Y
C	Y	X	Z
D	Y	Z	X

2)

A ductile material is stretched by a tensile force to a point beyond its elastic limit. The tensile force is then reduced to zero. The graph of force against extension is shown below.



Which area represents the net work done on the sample?

A X **B** X + Y **C** Y + Z **D** Z

3)

Which two substances are normally both crystalline?

A copper and diamond

B copper and glass

C diamond and glass

D diamond and rubber

4)

Which of the following correctly defines the terms *stress*, *strain* and *Young modulus*?

	stress	strain	Young modulus
A	(force) x (area)	(extension) x (original length)	(stress) / (strain)
B	(force) x (area)	(extension) / (original length)	(stress) x (strain)
C	(force) / (area)	(extension) / (original length)	(stress) / (strain)
D	(force) / (area)	(extension) x (original length)	(stress) x (strain)

5)

A wire is stretched by 8 mm when a load of 60 N is applied.

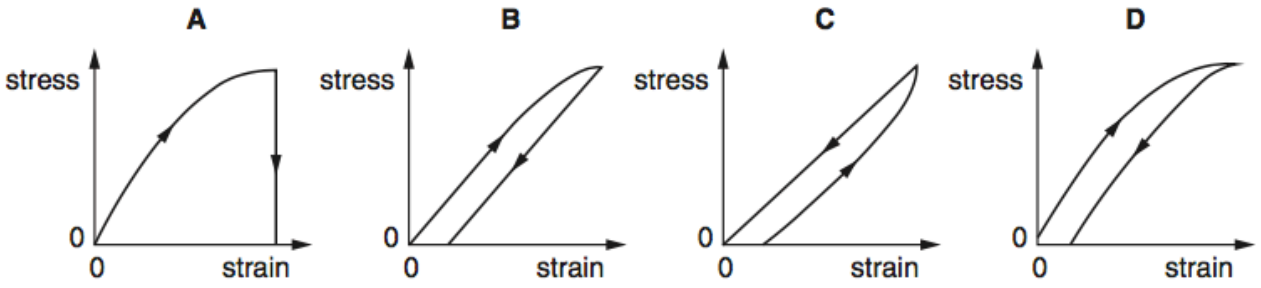
What will be the extension of a wire of the same material having four times the cross-sectional area and twice the original length, when the same load is applied?

A 2 mm **B** 4 mm **C** 8 mm **D** 16 mm

6)

A suspended copper wire is gradually loaded until it is stretched just beyond the elastic limit, and it is then gradually unloaded.

Which graph (with arrows indicating the sequence) best illustrates the variation of the tensile stress with longitudinal strain?



7)

What is the ultimate tensile stress of a material?

A the stress at which the material becomes ductile

B the stress at which the material breaks

C the stress at which the material deforms plastically

D the stress at which the material reaches its elastic limit

8)

What is the Young modulus of a metal?

A extension / force

B force / extension

C strain / stress

D stress / strain

9)

Nylon breaks when the stress within it reaches 1×10^9 Pa.

Which range includes the heaviest load that could be lifted by a nylon thread of diameter 1 mm?

A 2 N to 20 N

B 20 N to 200 N

C 200 N to 2000 N

D 2000 N to 20 000 N

10)

The table shows a load applied to four wires and the cross-sectional area of each.

Which of the wires is subjected to the greatest stress?

	load / N	cross-sectional area / mm^2
A	1500	0.25
B	2000	1.0
C	3000	0.56
D	5000	2.3

11)

Two steel wires P and Q have lengths l and $2l$ respectively, and cross-sectional areas A and $\frac{A}{2}$ respectively. Both wires obey Hooke's law.

What is the ratio $\frac{\text{tension in P}}{\text{tension in Q}}$ when both wires are stretched to the same extension?

A $\frac{1}{4}$ **B** $\frac{1}{2}$ **C** $\frac{2}{1}$ **D** $\frac{4}{1}$

12)

A wire stretches 8 mm under a load of 60 N.

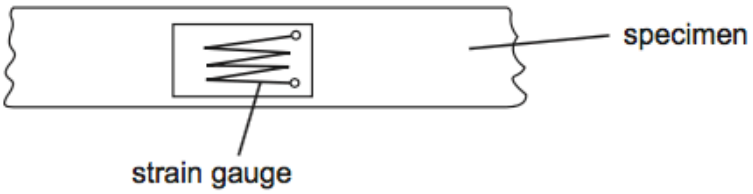
A second wire of the same material, with half the diameter and a quarter of the original length of the first wire, is stretched by the same load.

Assuming that Hooke's law is obeyed, what is the extension of this wire?

A 1 mm **B** 4 mm **C** 8 mm **D** 16 mm

13)

Tensile strain may be measured by the change in electrical resistance of a strain gauge. A strain gauge consists of folded fine metal wire mounted on a flexible insulating backing sheet. The strain gauge is firmly attached to the specimen, so that the strain in the metal wire is always identical to that in the specimen.



When the strain in the specimen is increased, what happens to the resistance of the wire?

A It decreases, because the length decreases and the cross-sectional area increases.

B It decreases, because the length increases and the cross-sectional area decreases.

C It increases, because the length decreases and the cross-sectional area increases.

D It increases, because the length increases and the cross-sectional area decreases.