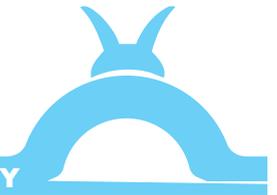


Effects of Heat

ENERGY



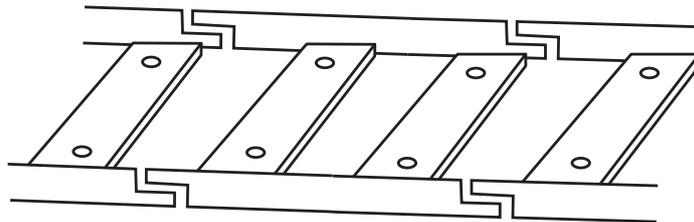
For questions 1 – 3, write down your answers in the spaces provided.

1. Benny wanted to spread some jam on his toast. When he took the bottle of jam out of the refrigerator, he realised that he could not unscrew the cap.

(a) What method can he use to open the bottle of jam? [2m]

(b) How does the method mentioned in (a) work? [2m]

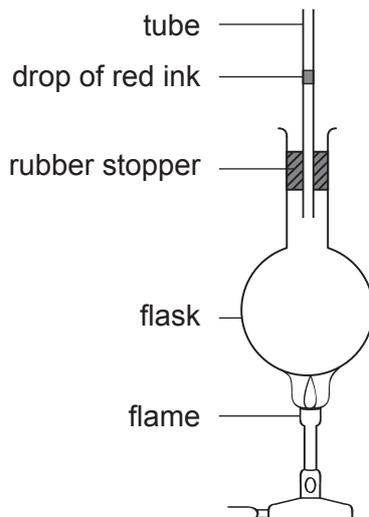
2. Study the diagram below.



(a) Why do you think gaps are left in railway tracks? [1m]

(b) What do you think will happen if there are no gaps built between the tracks? [1m]

3. Erica inserted a glass tube with a drop of red ink in it into a flask as shown below. She then heated the flask over a flame.

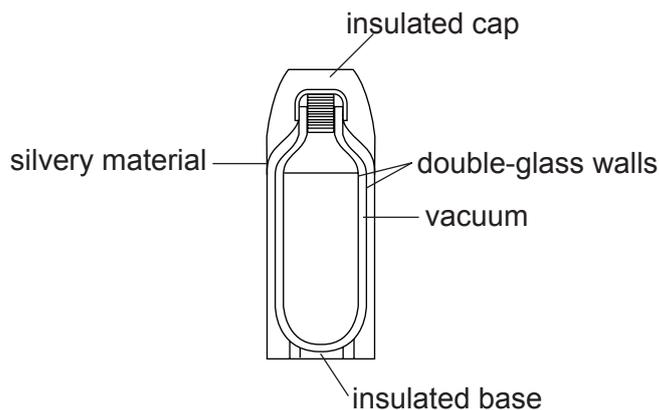


(a) What happened to the drop of red ink in the glass tube? [2m]

(b) Explain your answer in (a). [2m]

For questions 4 – 6, write down your answers in the spaces provided.

4. Study the diagram below.



(a) Why must we never drop a vacuum flask? [1m]

(b) How do the following parts help a vacuum flask maintain temperature? [4m]

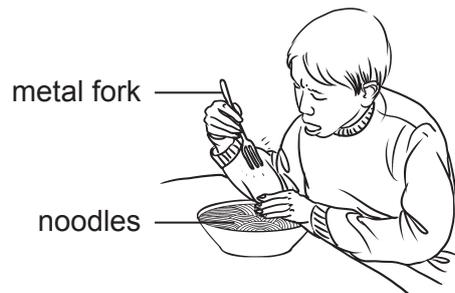
Vacuum: _____

Double-glass walls: _____

Outer container lined with silvery material: _____

Insulated base and cap: _____

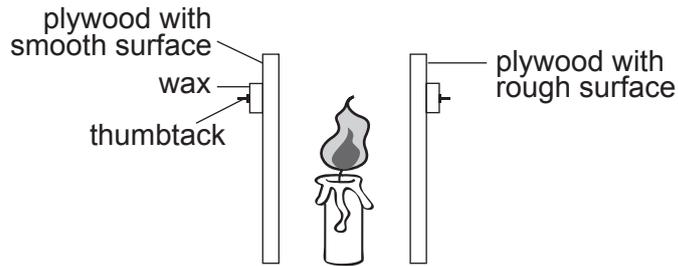
5. Timmy left his metal fork in a bowl of hot noodles for a few minutes before having his lunch. When Timmy picked up his fork to eat his noodles, it felt hot.



(a) Explain clearly why the fork was hot. [2m]

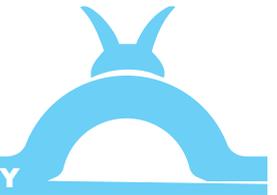
(b) What other utensils could Timmy have used instead so that his fork would not turn hot? [1m]

6. Damien has two planks of plywood. One has a smooth surface while the other has a rough surface. He stuck a thumbtack on each plank of plywood using wax. He then placed a lit candle between the two planks.



(a) What do you think Damien will observe after a few minutes? [1m]

(b) Explain your answer in (a). [1m]



1. (a) He can immerse the cap in a bowl of hot water for a few minutes before trying to open it again. *(Accept any other reasonable answers.)*
(b) The heat from the water will cause the cap to expand, hence loosening it and making it easier for Benny to open it. *(Accept any other reasonable answers with reference to (a).)*
2. (a) The gaps in the tracks provide room for the tracks to expand when they get heated up by the sun.
(b) The railway tracks will expand and buckle, which turns into a safety hazard for passengers on the trains.
3. (a) It dropped a little at first before rising.
(b) The flask got heated first, so it expanded. Therefore, the drop of red ink fell at first. When the air in the flask gained heat, it expanded and pushed against the drop of red ink. Hence, the drop of red ink rose.
4. (a) Dropping the flask would cause the glass walls to break and the vacuum to dissipate.
(b) Vacuum: As there is no air, heat cannot be lost by conduction or convection.
Double-glass walls: Glass is a poor conductor of heat.
Outer container lined with silvery material: Shiny materials are poor radiators of heat. Hence, the lining prevents heat from entering or leaving via radiation.
Insulated base and cap: They prevent heat from entering or leaving via conduction as both the base and cap are poor conductors of heat.
5. (a) Metal is a good conductor of heat. Therefore, the metal fork had gained a lot of heat when Timmy left it in the bowl of hot noodles. Hence, the fork was hot when he touched it.
(b) He could have used plastic utensils instead.
6. (a) The thumbtack which is attached to the plywood with the rough surface will fall off first. The other thumbtack will only begin to fall off after that.
(b) This is because rough surfaces are better absorbers of heat.