ENERGY TRANSFORMATION

(Use $g = 9.8$ m/s^2)

1. Find the E_k gain of a 10 kg object falling through 8 metres.

2. A stone is dropped down a vertical shaft and has 200 J of energy just before impact at the bottom. If the mass of the stone is 0.5 kg find the depth of the shaft.

3. What is the maximum height that a 0.5 kg ball will reach when thrown vertically upwards with a E_k of 200 J.

4. A space capsule strikes the sea with a velocity of 20 ms^{-1}. If it has a mass of 1 500 kg what is its E_k on impact with the sea?

5. An arrow which is fired vertically upwards leaves the bow with a velocity of 20 ms^{-1}. If the arrow weighs 0.25 kg how much P.E. has it gained at the point when it just begins to fall.

6. A stone is dropped from a 20 m cliff and just before impact has 400 J of energy. What is the mass of the stone?

7. The E_p of a hill trolley is raised to 10 000 J. Through what distance would it be raised if its mass was 15 kg.

8. How much kinetic energy must be supplied to a 7 kg rock projected vertically upwards if it is just to reach a maximum height of 15 metres?

9. When an athlete does a high jump her centre of gravity increases from 1 m to 2 m. If the athlete's mass is 60 kg find:

    (a) her increase in potential energy
            and
    (b) her initial vertical velocity.

10 A 9 kg object is dropped 7 m from rest. Find:

    (a) its gain in kinetic energy
    (b) its loss in potential energy
            and
    (c) its velocity at this point.

ANSWERS

1.	784 J	6.	2 kg
2.	40.8 m	7.	68 m
3.	40.8 m	8.	1029 J
4.	300 000 J	9.	(a) 588 J (b) 4.4 ms^{-1}
5.	50 J	10.	(a) 617 J (b) 617 J (c) 11.7 ms^{-1}