MOTION DOWN A HILL

1 A hillside is covered with snow. A skier is travelling down the hill.

Fig. 1.1

The table below gives the values of the acceleration of the skier at various heights above the bottom of the hill.

height / m	350	250	150	50
acceleration $\frac{}{m/s^2}$	7.4	3.6	1.2	0

(a) On Fig. 1.2, plot the values given in the table, using dots in circles.
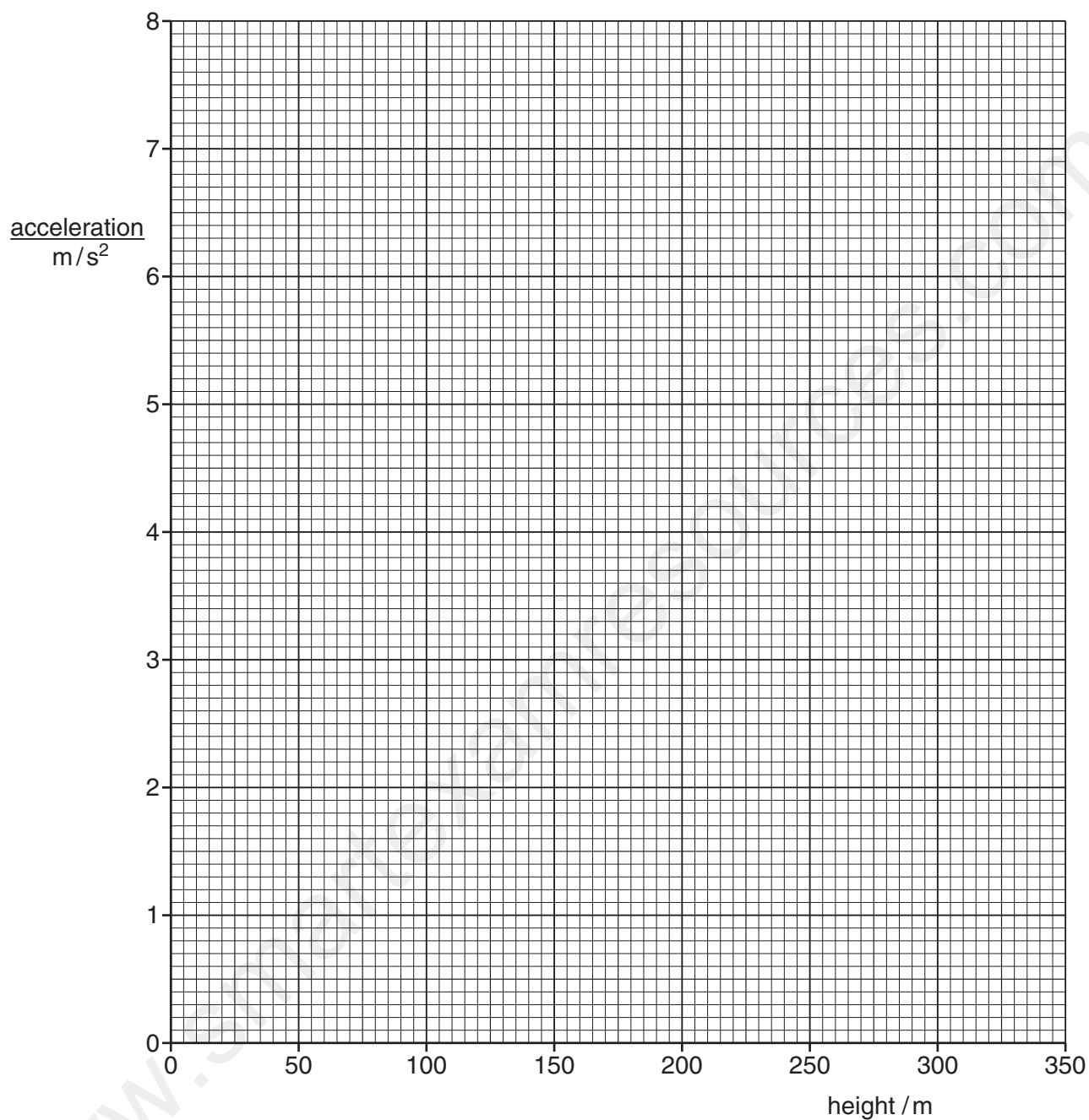
Draw the best curve for these points. [2]

Fig. 1.2

(b) Describe what is happening, during the descent, to

    (i) the acceleration of the skier,

       ....

       ....

       .... [1]

    (ii) the speed of the skier.

       ....

       ....

       .... [1]

(c) The acceleration becomes zero before the skier reaches the bottom of the hill.

    Use ideas about forces to suggest why this happens.

    ....

    .... [1]

(d) Below a height of 50 m, further measurements show that the acceleration of the skier has a negative value.

    What does this mean is happening to the speed of the skier in the last 50 m?

    ....

    .... [1]

(e) The skier has a mass of 60 kg.

    Calculate the resultant force on the skier at a height of 250 m.

                               resultant force = ... [3]

[Total: 9]

(a) all points plotted correctly ±½ small square   B1
     smooth curve through points, by eye   B1

(b) **(i)**   decreasing OR idea of greater at greater heights   NOT decelerating   B1

     (ii)   increasing OR idea of slower at greater heights   NOT accelerating   B1

(c) idea of resultant force becomes zero   B1

(d) decreasing/slowing down, ignore deceleration   NOT accelerating   B1

(e) $F = ma$ in any form, letters, words, numbers   C1
     ($a =$)   3.6 (m/s^2) c.a.o.   C1
     ($F =$)   216 N / 220 N   A1

[Total: 9]