Question	Answer	Mark
1(a)	From time zero, line of constant positive gradient, not necessarily from origin Horizontal line from end of sloping line Line of steeper positive gradient from end of horizontal line	B1 B1 B1
1(b)	(distance =) area under graph stated $0.5 \times 7.5 \times 3.3$ (= 12.375) $+ 12.5 \times 3.3$ (= 41.25) $+ 0.5 \times 5 \times 3.3$ (= 8.25) OR ½ (a + b)h $= 0.5 \times (25 + 12.5) \times 3.3$ OR $(25 \times 3.3) - (0.5 \times 12.5 \times 3.3)$ 62 m	C1 C2 (C1) (C1) (C2) A1
		Total: 7

2 (a speed × time in any form, symbols, numbers or words
       OR any area under graph used or stated   [1]
       13 (m/s) OR 24 (s) seen or used in correct context   [1]
       312 m (2 or 3 sig. figs.)   [1]

   (b) rate of change of speed OR gradient of graph OR 18/12   [1]
        18 (m/s) OR 12 (s) seen or used in correct context   [1]
        1.5 m/s^2 [1]

   (c) same gradient / slope OR equal speed changes in equal times OR
        allow graph symmetrical   [1]

3 (a (i) acceleration OR increasing speed   C1

            constant acceleration OR constant rate of increase in speed   A1

       (ii) decreasing acceleration OR decreasing rate of increase in speed
             NOT deceleration   B1

   (b) mention of air resistance AND weight (of object) / force due to gravity   B1

        acceleration at start (of fall) is acceleration of gravity / $10\,m/s^2$ / a maximum / g
        OR acceleration decreases (as it falls)   B1

        air resistance increases as speed increases/as it accelerates   B1

        acceleration zero/terminal velocity/constant speed/maximum speed when
        air resistance = weight   B1

                                                                          [Total: 7]

4   **(a**   **(i)**   horizontal line at 10 m/s   B

     (ii)   straight line from origin to (5.0, 25)   B1

  (b)   **(i)**   50 m   B1

     (ii)   area of triangle OR   ½ × 25 × 5.0

          62.5 m OR 63 m   A1

    (iii)   when areas under graphs are equal   C1
          4.0 s   A1

                                      [Total: 7]

5   **(a**   point marked P (on line or time axis) at $t \geq 2.0$ s   B1

  (b)   attempt at gradient OR (a =) $\Delta v/t$ OR $(v - u)/t$ OR 240 (–0)/2.0
          OR division of correct points on graph   C1
          120 m/s^2 A1
     (ii)   suggestion of area (under graph) in words or formula or numbers
          OR 0.5 (120 + 240) × 1.0 OR [(120 × 1.0) + (0.5 × 120 × 1.0)]   C1
          180 m   A1

  (c)   mass of sled changes / decreases OR fuel used up   B1

                                        [Total: 6]

6 **(a** **(i)** (it / comet) travels in a straight line   B1

    (ii) area (under graph) OR s = vt in any form OR vt   C1
        220 000 m OR 220 km   A1

  (b) negative acceleration OR deceleration OR (it / the comet) is slowing down   B1
      acceleration / deceleration (only accept **it** if acc / decel already mentioned)
      not constant allow either increasing or decreasing   B1

  (c) attempt at gradient OR (a =) $\Delta v / \Delta t$ OR (0–)12 000 / 2.0 OR other correct values for $\Delta v / \Delta t$ C1
      (–)6000 m/s^2 tolerance 5000 – 7000 m/s^2 A1

  (d) (it / comet) hits surface (of planet)
      OR stops o.w.t.t.e.   B1

[Total: 8]

7 **(a** speed is constant / uniform / unchanging OR terminal velocity / speed
      no net / resultant force OR air resistance cancels / equals weight   B1

  (b) P between 0.25 s and 1.90 s (inclusive)   B1

  (c) **(i)** (a =) $\Delta v / t$ OR 2.5 / 0.25 OR other point on correct section of line   B1
        9.6 to 10 m/s^2 (inclusive)   B1

    (ii) area under graph OR attempt at counting squares OR between 16.2 and 17.5 m
        (inclusive)   C1
        between 16.5 and 17.1 m (inclusive)   A1

[Total: 7]