1 (a) (i) 18 m/s   B1

   (ii) (0.90 s is) driver's time to react   B1

   (b) (i) (a =) (v – u)/t OR Δv/t OR either in words OR (18 – 0)/3.1 OR 18/3.1
                $5.8 \, m/s^2$ A1
                OR
                Values from any correct points on graph   (C1)
                Answer dependent on accuracy of chosen points   (A1)

   (ii) Evidence of use of: (distance =) area under graph e.g. 1/2bh
            (18 × 0.9) + (0.5 × 3.1 × 18)   C1
            44 m   A1

   (c) (Without seat belt, driver:) e.g. keeps moving (forwards)/does not stop/has
            inertia/has momentum   B1

            (Driver) hits steering wheel/windscreen/dashboard

                                                                          [Total: 9]

2 (a dots farther apart (in 2nd time interval) owtte   B1

   (b) (i) (average speed =) d ÷ t, in any form, e.g. words, symbols, numbers   C1

              0.095 m/s   A1

   (ii) (average speed =) 0.29 m/s   B

   (c) (a =) (v – u) ÷ t   C1

         = (candidate's **(b)(ii)** – candidate's **(b)(i)**) ÷ 0.02   C1

         correct value calculated from candidate's values in **(b)(i)(ii)**, expect $9.5 \, m/s^2$ A1

3   (a   metre rule, tape measure, (surveyor's) laser measurer, trundle wheel
         tape is too vague,   accept rule(r)   B1

    (b) $M = \rho V$ in any form or ρV in words, symbols or numbers   C1

         (mass = 1.2 × 76.4 =) 92 kg   A1

    (c) mass (of air) in room decreases   B1

         (because) air expands/vol of air increases/density of air decreases/
         appropriate use of $pV = nRT$ OR pressure argument e.g. pressure would have
         increased (with constant volume) if mass constant   B1

         any ONE from: B1
         some air leaves room
         molecules collide harder or more (often)
         molecules move faster/have more energy
         molecules move further apart   NOT molecules expand

                                                                         [Total: 6]

4   (a   Period: 1.81 s OR 1.8 s as mean value
         OR 1.8 s as most common reading / the mode   B1

    (b) Time a minimum of 2 (successive) oscillations   B1
         Divide result by the number of oscillations   B1
         OR
         Count no. of oscillations in at least 20 s   (B1)
         Divide the time by the number of oscillations
         OR Divide no. of oscillations by time and find reciprocal   (B1)
         2 of:
         Repeat (several times) and find mean
         Time with reference to fixed / fiducial point or top or bottom of oscillation
         Check / set zero of stop-watch   B2
         Show knowledge of what is meant by one oscillation

                                                                         [Total: 5]

5 **(a)** scalar, vector, scalar, vector, scalar   B3

   (b)   (average speed) = distance / time OR 18/1.2   C1
                  = 15 m/s   A

       (ii) (time =) (total) distance / speed OR 21/15   C1
                 = 1.4 s   A1

       (iii) air resistance / friction / force opposing motion   B1

       (iv) velocity changes because direction changes   B1   [9]