Mark Scheme (Results)
January 2007

O Level Mathematics B (7361_02)

A PEARSON COMPANY

7361 Paper 2, January 2007
Mark Scheme

1. (a) $360 - (154 + 92)$ M1

     114   A1   2

   (b) $\dfrac{2052}{"114"}$ $(= 18)$ M1

     $154 \times "18" + 92 \times "18" + 2052$

OR

     $\dfrac{2052}{114} \times 360$ M1 (DEP)

     6480   A1   3   **5**

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2. (a) $\dfrac{2}{16} \times 32000$ (o.e)   M1

     4000   A1   2

   (b) $\dfrac{5}{16} \times 32000$ (=10 000, Red)

OR

     $28000 - (4000 + "10000")$ (Yellow)   M1 (one of red or yellow)

     $18000 - 4000$ (Yellow)   M1 (DEP: both)

OR

     $\dfrac{32000}{16}$ $(= 2000)$ M1 (one of)

     $\dfrac{"18000 - 4000"}{2000}$ (o.e)   M1 (DEP)

     2: 5: 7   OR   1: 2.5: 3.5

                (c.a.o)   A1   3   **5**

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3. $\begin{pmatrix} 2x^2 & 2xy \\ 2xy & 2y^2 \end{pmatrix}$　　　　　B2 (-1eeoo)

[accept $x^2 + x^2$ or x.x + x.x for $2x^2$, ditto for $2y^2$]
　　$2xy = w$, $2x^2 = 2$, $2y^2 = 32$ (o.e)　M1 (one of, ft on their above matrix)

　　　　　　　　　　　　　　　　　M1 (DEP: all ft on their above matrix)

　　$x = 1$, $y = 4$, $w = 8$　　(c.a.o) A1　　　　　　　　**5**

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4. (a) 8 + 4a - 4 -24 = 0　　　　　M1

　　　a = 5　　　　　　　　　　　A1　　　　2

　(b) $x^2 + 7x$　　　　　　　　M1 (2 terms correct)

　　　$x^2 + 7x + 12$　　　　　　A1

　　　(x + 3) (x + 4)　　　　　　M1 (INDEP: *factorising* their trinomial
　　　　　　　　　　　　　　　　　　　　quadratic)

　　　(x - 2) (x + 3) (x + 4)　　　A1　　　　4　　　　**6**

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5.　　252000 cm^3 or 0.252m^3　　B1 (*volume* of tank)

　　　3.5 × 100 cm/sec　　　　　　M1 (*conversion* of m to cm or m to cm
　　　　　　　　　　　　　　　　　　　　or cm^3 to m^3)

　　　"3.5 × 100" × 1.2 (= 420)　　M1(volume of water flow per sec)

　　　$\dfrac{252000}{420}$　　　　　　　　M1(DEP on above: time to fill volume of

　　　　　　　　　　　　　　　　　tank in secs)

　　　"$\dfrac{252000}{420}$" ÷ 60　　　　M1 (*conversion* of sec to mins)

　　　10 minutes　　　　　　　　A1　　　　6　　　　**6**

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6. $20 + 5 + x + y + 12 + 6 + 15 = 69$ M1

  $x + y = 11$ A1

  $(x+y) + (6+y) + (5+y) = 28$ M1

  $\left(x + 3y = 17 \text{ or } 2y = 6\right)$

  Subtraction of 2 simul. eq^{n}s in x and y
  or use of $x + y = 11$ in a simul. eq^n
                          M1
  Completion of solution of 2 simul eq^{n}s
                          M1 (DEP on above mark)

  $x = 8$ A1

  $y = 3$ A1   **7**

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7. (a) $\dfrac{3}{2}$ or 1.5   (c.a.o)   B1   1

  (b) $5\left(\dfrac{x+1}{2x}\right) - 2$ M1

  $\dfrac{x+5}{2x}$ OR $\dfrac{1}{2} + \dfrac{5}{2x}$ A1   2

  (c) $x \neq 0$ B1   1

  (d) "$\dfrac{x+5}{2x}$" $= 2x$ M1

  Solving trinomial quadratic   M1 (INDEP)

  $\dfrac{5}{4}$, -1   A1, A1   4   **8**

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(8)   (a)   Seen in 1st col at correct place: 0.8

      Seen in 2nd col at correct places: 0.6, 0.4, 0.4 (in decreasing col. order)

      Seen in 3rd col at correct places: 0.7, 0.3, 0.7, 0.3 (in decreasing col. order)

                          B3(-1 eeoo)   3

(b)   P(HMM) + P(HH) + P(HMH) + P(MHM) + P(MHH)

= $0.2 \times 0.4 \times 0.3 + 0.2 \times 0.6 + 0.2 \times 0.4 \times 0.7 + 0.8 \times 0.6 \times 0.3 +$
      $0.8 \times 0.6 \times 0.7$

OR $1 - 0.8 \times 0.4$ M1

      0.68   A1   2

(c)   P(HH) $= 0.2 \times 0.6 = 0.12$ B1 (either, or implied)

       P(HMH) $= 0.2 \times 0.4 \times 0.7 = 0.056$ B1 (either, or implied)

       P(MHH) $= 0.8 \times 0.6 \times 0.7 = 0.336$ B1 (either, or implied)

       Prob $=$ "0.12" $+$ "0.056" $+$ "0.336"   M1

       0.512   A1   5   **10**

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9. (a) (i) $(\lambda - 1)\, \mathbf{b}$ B1

   (ii) $\mathbf{a} +$ "$(\lambda - 1)\, \mathbf{b}$"   M1
        (o.e)   A1   3

 (b) (i) $(\mu - 1)\, \mathbf{a}$ B1

   (ii) $\mathbf{b} +$ "$(\mu - 1)\, \mathbf{a}$"   M1
        (o.e)   A1   3

 (c) $(\lambda - 2)\, \mathbf{b} = (\mu - 2)\, \mathbf{a}$ M1

     $(\lambda - 2) = 0$ and $(\mu - 2) = 0$ (o.e)   M1 (DEP)

     $\lambda = 2, \mu = 2$ A1, A1   4

 (d) Rhombus or parallelogram   B1   1   **11**

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10. (a) ΔABC drawn and labelled   B1   1

(b) $\begin{pmatrix} 6 & 3 & 0 \\ 6 & 3 & 3 \end{pmatrix}$ B2 (-1eeoo)   2

(c) $\Delta A'B'C'$ drawn and labelled   B1 ft   1

(d) $\begin{pmatrix} -6 & -3 & -3 \\ 6 & 3 & 0 \end{pmatrix}$ B2(-1eeoo)   2

(e) $\Delta A''B''C''$ drawn and labelled   B1 ft   1

(f) enlargement about origin   B1

     scale factor 3   B1

     rotation 90° B1

     centre origin   B1   4   **11**

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11. (a) $25 = \dfrac{1}{2} \times 5 \times BD$ (o.e)   M1

     10.0   A1   2

(b) $\sqrt{(5^2 + "10"^2)}$ M1

     11.2   A1   2

(c) $\tan \angle BDA = \dfrac{5}{"10"}$ (o.e)   M1

     26.5^o, 26.6^o, 26.7^o, 26.8^o (c.a.o)   A1   2

(d) area of ΔABC $\left("\dfrac{3}{2} \times 25"\right) = \dfrac{1}{2} \times 5 \times BC$

     (or $\dfrac{BC}{"10"} = \dfrac{3}{2}$)   M1

     "15" - "10"   M1(DEP)

     5   A1   3

(e) $\sqrt{"15"^2 + 5^2}$ $(= 15.81)$ M1

     $\pi \times \left(\dfrac{"15.81"}{2}\right)^2$ (o.e)   M1 (DEP)

     196   A1   3   **12**

12.

Any readings and answers are $\pm$ 1 small square

(a) 5.13,   5 (OR 5.0, OR 5.00), -3.30 (OR -3,3) ,   -3.13   cao

                                                    B3 (-1 eeoo)   3

(b) curve   B3   3
        -1 mark for incorrect/ non-uniform scale
                straight line segments
                each point missed
                each missed segment
                each point not plotted
                each point incorrectly plotted
                tramlines
                very poor curve

(c) 1.3 (min), -1.3 (max)   B1ft, B1ft   2

(d) -2.3 < x < 0.2   B1ft

    x > 2.1   B1ft   2
[accept use of $\leq$ and $\geq$ for 1st and 2nd Bs respectively]

(e) line y = -x drawn   M1

    -2.1, 0.3, 1.9   A1ft, A1ft, A1ft
                                                    4   **14**

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