



PERTH MODERN SCHOOL
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Independent Public School

Course Methods**Year 11**

Student name: Solutions Teacher name: _____

Date: 27/07/20

Task type: Response

Time allowed for this task: 30 mins

Number of questions: 5

Materials required: NO CALCULATORS ALLOWED
ONE A4 PAGE BOTH SIDES OF NOTES ALLOWED
FORMULA SHEET PROVIDED

Standard items: Pens (blue/black preferred), pencils (including coloured), sharpener,
correction fluid/tape, eraser, ruler, highlighters

Special items: Drawing instruments, templates and formula sheet

Marks available: 30 marks

Task weighting: 10 %

Formula sheet provided: Yes

Note: All part questions worth more than 2 marks require working to obtain full marks.

Question 1 (1.3.2)

(2, 2 = 4 marks)

Evaluate and express your answer in whole numbers.

$$\begin{aligned} \text{i) } 6! &= 6 \times 5 \times 4 \times 3 \times 2 \times 1 \checkmark \\ &= 720 \checkmark \end{aligned}$$

$$\begin{array}{r} 36 \\ \times 20 \\ \hline \end{array}$$

$$\begin{aligned} \text{ii) } \binom{10}{6} &= \frac{10!}{(10-6)! 6!} \\ &= \frac{10!}{4! 6!} \checkmark \\ &= \frac{10 \times \cancel{9} \times \cancel{8}^3 \times 7}{4 \times \cancel{3} \times 2} \\ &= 210. \checkmark \end{aligned}$$

Question 2 (1.3.1)

(2, 3 = 5 marks)

a) Expand $(1 - x)^4$ in ascending powers of x . Express your answer as whole numbers. ✓

$$= x^4 - 4x^3 + 6x^2 - 4x + 1 \quad \checkmark$$

b) Show how you would use your answer in (a) to calculate the value of 0.99^4 . State this value correct to 4 decimal places. ✓

$$\begin{aligned} (1 - 0.01)^4 &= \cancel{(0.01)^4} - \cancel{4(0.01)^3} + 6(0.01)^2 - \cancel{4(0.01)} + 1 \\ &= 0.9606 \quad \checkmark \end{aligned}$$

$$\begin{array}{r} 0.9 \\ 1.0000 \\ - 0.0400 \\ \hline 0.9600 \\ + 0.0006 \\ \hline 0.9606 \quad \checkmark \end{array}$$

$$\begin{array}{r} 1.000 \\ + 0.00000001 \\ + 0.0006 \\ \hline 1.00060001 \\ - 0.04000400 \\ \hline 0.9606 \quad \checkmark \end{array}$$

Question 3 (1.3.2)

(1, 1, 1, 2, 2 = 7 marks)

The Australian Chess team of 9 people is to be selected from 10 from West Australia, 8 from NSW and 5 from Victoria. Write mathematical expressions for the number of different ways the team can be selected if:

- a) There are no restrictions

$$\binom{23}{9} \quad \checkmark$$

- b) All three states are equally represented.

$$\binom{10}{3} \binom{8}{3} \binom{5}{3} \quad \checkmark$$

>

- c) There are no Victorians

$$\binom{18}{9} \quad \checkmark$$

- d) The NSW representatives are in the majority

$$\binom{8}{5} \binom{15}{4} + \binom{8}{6} \binom{15}{3} + \binom{8}{7} \binom{15}{2} + \binom{8}{8} \binom{15}{1} \quad \checkmark \checkmark$$

- e) The WA husband and wife pair Elise and Nathan can only afford to have one of them in the team.

$$\binom{23}{9} - \binom{2}{2} \binom{21}{7} \quad \checkmark \checkmark$$

or

$$\binom{2}{1} \binom{21}{8} + \binom{21}{9}$$

Question 4 (1.2.7)

(1, 1, 1, 1, 2, 2 = 8 marks)

The diagram shows a unit circle with centre O . A is a point on the unit circle with co-ordinates (p, q) . The ray OA is inclined at an angle of 25° to the positive x -axis as shown. Use the unit circle to find in terms of p and/or q :

a) $\cos -25^\circ = p \checkmark$

b) $\sin (25^\circ) = q \checkmark$

c) $\cos (155^\circ) = -p \checkmark$

d) $\sin (205^\circ) = -q \checkmark$

e) $\tan (115^\circ) = \frac{-q}{p} \checkmark \checkmark$

f) $\tan (-155^\circ) = \frac{q}{-p} \checkmark$



