

**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.

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

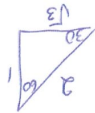
$$\begin{array}{r} 36 \\ \times 20 \\ \hline \end{array}$$

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

Question 5 (1.2.8)

What are the exact values of

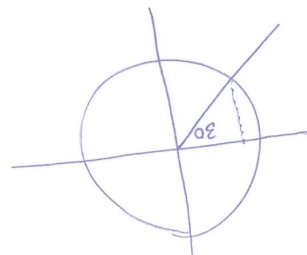
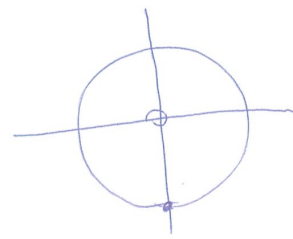
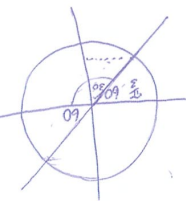
a)  $\sin\left(-\frac{3}{2}\pi\right) = -\sin 60 = -\frac{\sqrt{3}}{2}$



b)  $\tan\left(\frac{6}{15\pi}\right) = \tan\left(\frac{12\pi}{6} + \frac{3\pi}{6}\right) = \tan\left(2\pi + \frac{\pi}{2}\right)$

$= \tan 90^\circ = \text{undefined}$

c)  $\cos 210^\circ = -\cos 30 = -\frac{\sqrt{3}}{2}$



(2, 2, 2 = 6 marks)

Question 2 (1.3.1)

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

(2, 3 = 5 marks)

$= x^4 - 4x^3 + 6x^2 - 4x + 1$

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.

$$\begin{array}{r} 0.9960 \\ - 0.0040 \\ \hline 0.9920 \\ + 0.0006 \\ \hline 0.9926 \\ + 0.000001 \\ \hline 0.992601 \end{array}$$

END OF TEST

**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

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

**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  $25^\circ$  to the positive x-axis as shown. Use the unit circle to find in terms of  $p$  and/or  $q$ :

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

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

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

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

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

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

