Year 10A Mathematics

End Term 3

40 marks

45 mins

Date

Instructions: 1. Answer all questions 2. Calculators permitted

Way too much to complete in 45 mins.
Some items would need to be deleted.

Question 1 (8 marks)

a) Find the simple interest charged on $50 000 borrowed for 3 years at 8.5% pa. (1)

b) How much would need to be invested at 6.5% pa for 6 months in order to earn $500 interest (6 months = 0.5 years)? (1)

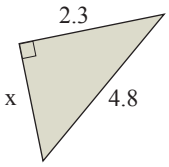
c) $25 500 is invested at 5.3% pa compounded yearly.
What will be the principal after 4 years (round to the nearest dollar)? (2)

d) Which produces the better outcome over 5 years?
i) $100 000 invested at 9% pa compounded yearly?
ii) $100 000 invested at 9% pa compounded monthly? (2)

e) A car is purchased for $35 000. What is the value of the car after 5 years if it depreciates in value by 10% each year (round to nearest $1000)? (2)

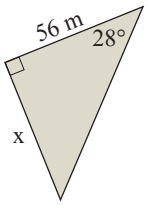
Question 2 (12 marks)

a) Use Pythagoras' theorem to find the length of the unknown side (round to two decimal places): (2)



b) Use the sin, cos, or tan ratio to find the unknown (round to two decimal places):

i)



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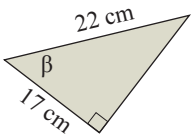

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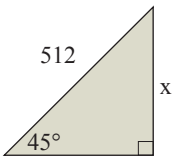
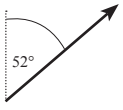


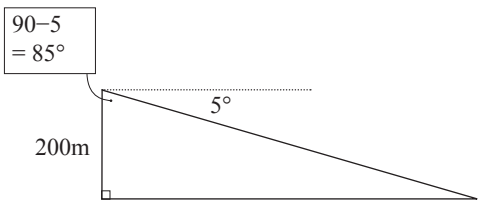
(2 each)

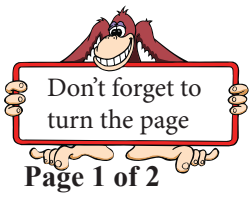
c) A plane flies due west for 126 km, then on a bearing of 52°T until the plane is due north of its starting point.
How far is the plane from its starting point? (2)



52°T is 52° clockwise from North.

d) From the top of a 200 m tower, the angle of depression to a fire is 5°.
How far away is the fire? (2)

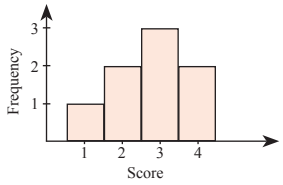




Question 3 (10 marks)

a) Find the mode, median, and the mean of each of the following:

i)



ii)

Score	Frequency
1	1
2	4
3	2
4	1

(2 each)

b) Year 10 students were tested on their box plot knowledge before and after a week of inclass learning about box plots. Use box plots to represent and then compare each data set.

Before learning	After learning
44, 70, 70, 43, 42, 56, 45, 56, 58, 40, 40, 64, 43, 57, 55, 56, 51, 47, 70, 58, 44	80, 90, 88, 81, 86, 67, 75, 70, 85, 77, 76, 70, 82, 88, 90, 69, 79, 85, 90, 65, 81

(3)

c) 10A Investigating the results of a three week ball dexterity program, a PE teacher collected the following dexterity indexes before and after the program. Find the mean and standard deviation of each data set and use these descriptive statistics to compare the sets of data.

Dexterity (before)	Dexterity (after)
17, 22, 14, 20, 16, 18, 15, 18, 18, 19, 16, 17, 23, 18, 17, 15, 18, 22, 23, 17, 17, 17, 21, 22, 19, 22, 16	22, 24, 21, 26, 15, 18, 19, 21, 28, 23, 18, 20, 18, 17, 24, 16, 19, 23, 18, 22, 21, 25, 21, 26, 18, 19, 18

(3)

Question 4 (10 marks)

a) 10A Write the equation of the circle with centre (1,3) and radius $\sqrt{3}$ units. (1)

b) 10A Sketch each of the following polynomials:

i) $y = (x + 2)(x - 2)(x - 3)$ **ii)** $x^3 - 2x^2 - x + 2 = 0$ (1,3)

c) 10A Sketch the following exponential function by completing the table of values, plotting the points, and drawing a smooth curve through the points. $y = 2^x - 1$ (2)

x	-3	-2	-1	0	1	2	3
$y = 2^x - 1$		-0.75					

d) 10A The amount of a drug in the bloodstream is modelled by the exponential decay function $A = 400 \times 1.3^{-t}$, where A is amount in milligrams and t is time in hours.

i) How much of the drug is in the bloodstream at time t = 0 hours? (1)

ii) How much of the drug is in the bloodstream after 2 hours? (1)

iii) Plot the function and use it to estimate when there is 100 mg. (1)

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Question 1 (8 marks)

a) Find the simple interest charged on $50 000 borrowed for 3 years at 7.5% pa. (1)

b) How much would need to be invested at 4.5% pa for 6 months in order to earn $1000 interest (6 months = 0.5 years)? (1)

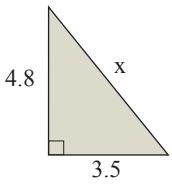
c) $250 000 is invested at 4.9% pa compounded yearly.
What will be the principal after 4 years (round to the nearest dollar)? (2)

d) Which produces the better outcome over 5 years?
i) $100 000 invested at 8% pa compounded yearly?
ii) $100 000 invested at 8% pa compounded monthly? (2)

e) A car is purchased for $24 000. What is the value of the car after 5 years if it depreciates in value by 10% each year (round to nearest $1000)? (2)

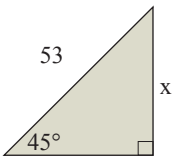
Question 2 (12 marks)

a) Use Pythagoras' theorem to find the length of the unknown side (round to two decimal places): (2)



b) Use the sin, cos, or tan ratio to find the unknown (round to two decimal places):

i)



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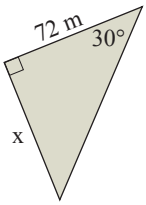
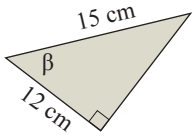
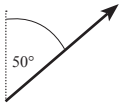


iii)



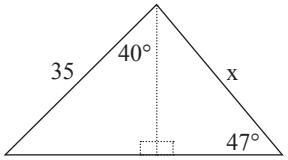
(2 each)

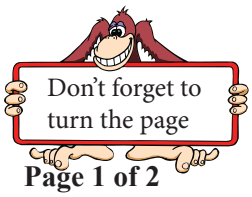
c) A plane flies due west for 91 km, then on a bearing of 50°T until the plane is due north of its starting point.
How far is the plane from its starting point? (2)



50°T is 50° clockwise from North.

d) Find the unknown in the diagram. (2)





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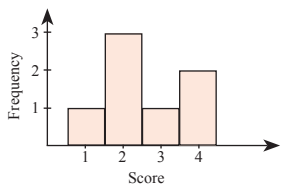

ii)

Score	Frequency
2	1
3	4
4	2
5	2

(2 each)

b) Depression affected patients were asked to self-rate their state of depression before and after treatment. Use box plots to represent and then compare each data set.

Before treatment	After treatment
20, 23, 22, 19, 17, 15, 26, 15, 22, 26, 17, 24, 30, 22, 20, 23, 22, 26, 26, 27, 29, 20, 25, 30	19, 17, 14, 23, 19, 19, 20, 20, 21, 23, 25, 14, 13, 15, 19, 21, 23, 23, 18, 16, 17, 13, 14, 20

(3)

c) 10A To test the effectiveness of two different product displays, shoppers were asked how much they spent on impulse buying after passing each shopping display. Find the mean and standard deviation of each data set and use these descriptive statistics to compare the sets of data.

Display A	Display B
15, 9, 10, 11, 12, 6, 9, 7, 10, 6, 10, 13, 7, 11, 6, 9, 9, 15, 8, 15, 7, 11, 10	11, 12, 10, 11, 11, 16, 11, 12, 11, 16, 10, 18, 11, 16, 10, 18, 13, 13, 10, 16, 12, 10, 19, 10, 15

(3)

Question 4 (10 marks)

a) 10A Write the equation of the circle with centre $(2,^{-}1)$ and radius $\sqrt{5}$ units. (1)

b) 10A Sketch each of the following polynomials:

i) $y = x(x + 1)^2(x - 2)$ **ii)** $x^3 - x^2 - 4x + 4 = 0$ (1,3)

c) 10A Sketch the following exponential function by completing the table of values, plotting the points, and drawing a smooth curve through the points. $y = 3^x - 1$ (2)

x	-3	-2	-1	0	1	2	3
$y = 3^x - 1$		-0.89					

d) 10A A town's population of 10 000 increases each year by 2%.

i) Use an exponential function to model the growth. (1)

ii) Estimate the town's population after 10 years. (1)

iii) When will the town's population double to 20 000? (1)

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