NSW Education Standards Authority

Mathematics Standard 1

HSC Marking Feedback 2022

Question 11

Students should:

- be able to interpret a scale drawing
- recognise commonly used symbols on floor plans
- be able to determine a scale or show how a given scale was determined
- find the area of rectangles and convert scale units to required units.

In better responses, students were able to:

- convert mm into m
- break apart the composite shape into smaller pieces, showing working for each individual piece
- convert units of length to required units before calculating an area.

Areas for students to improve include:

- recognising the difference between area and perimeter
- obtaining measurements from scale drawings
- using a floor plan length and an actual length to determine a scale
- using a given scale to determine floor plan lengths and/or actual lengths.

Question 12

Students should:

- be able to apply a daily hire cost (unitary method) to a period (multiple days)
- be able to use a unitary value (cost per kilometre) to determine a total cost over a specific distance.

In better responses, students were able to:

- split the question into two parts and determine the fixed and variable components
- determine the total daily hire cost and total cost per kilometre by multiplying each by the number of days and number of kilometres respectively and adding to find the total cost.

Areas for students to improve include:

- showing full working.

Question 13

Students should:

- be able to compare questions within a survey and identify differences
- use mathematical language when making comparisons
- be able to identify the features of a graph that make it misleading.

In better responses, students were able to:

- identify the misleading features of a graph, in this case the incorrect vertical scale and the varying width of the columns
- communicate their thinking and articulate their response
- use correct terms, such as 'scale' and 'axis'.

Areas for students to improve include:

- understanding the features of a graph that may make it misleading
- reading the question carefully and responding appropriately.

Question 14

Students should:

- understand how to read and interpret a distance-time graph
- understand the connection between a gradient and the rate of change of the two variables being graphed.

In better responses, students were able to:

- identify that the fastest speed occurred where the slope was steepest
- distinguish whether Jamie was moving and in which direction.

Areas for students to improve include:

- understanding the meaning of the word 'from'
- understanding that the vertical axis represented the distance 'from' town N
- adding distances on a travel graph
- justifying their answers using comparative language.

Question 15

Students should:

- read the question carefully, underlining key data in the question
- be able to use the formula
- be able to find the percentage of an amount.

In better responses, students were able to:

- perform the subtraction correctly
- show their working before they wrote their answer.

Areas for students to improve include:

- finding the percentage of an amount.

Question 16

Students should:

- know the difference between linear graphs (straight lines) and non-linear graphs (a curve - cannot be drawn using a ruler)
- be able to read the scale used on the axes and understand the value of each unit
- know how to interpret a non-linear function and be able to interpolate from the curve.

In better responses, students were able to:

- interpret the graph and provide the correct answer
- show evidence of working by using the graph to establish the correct distance.

Areas for students to improve include:

- interpreting non-linear functions
- joining the points on the curve to make a correct interpretation
- reading a horizontal value on a graph given the vertical value
- understanding the scale on a graph.

Question 17

Students should:

- be able to identify odd numbers
- understand complementary probability.

In better responses, students were able to:

- identify the 5 odd numbers
- successfully subtract the odd numbers from the remaining numbers
- find the probabilities by considering the correct sample space
- use a complementary probability argument correctly
- understand that probabilities lie between 0 and 1 and write this as a fraction
- understand that complementary events can be calculated by using $1 - P(event)$.

Areas for students to improve include:

- reading the question carefully
- understanding what an odd number is
- understanding that $P(not\ winning) = 1 - P(winning)$.

Question 18

Students should:

- understand what UTC + and UTC- means in terms of position in the world
- draw a timeline to help calculate the time difference between different time zones.

In better responses, students were able to:

- correctly calculate the time difference (13 hours) and add to 9am Monday
- recognise that Singapore was ahead of NY and that time needed to be added on
- add 5 to calculate the time at UTC and then add 8 to find the time and day in Singapore.

Areas for students to improve include:

- indicating both day and time in the answer

- calculating the total time difference with values of -UTC and +UTC
- calculating the time difference between different time zones.

Question 19

Students should:

- be able to substitute correct values into a formula and then solve
- be able to use trial and error to accurately determine an answer
- be able to perform simple multi-step algebraic methods.

In better responses, students were able to:

- show correct substitution into the formula provided (identifying 200mg as adult dose and 24 mg as child's dose)
- correctly calculate Betty's age through guess and check or solving the equation.

Areas for students to improve include:

- showing substitution into a given formula
- substituting values into the correct place within a formula.

Question 20

Students should:

- draw and label the network representing the data in each table
- find the minimum spanning tree and calculate its length.

In better responses, students were able to:

- correctly draw the network diagram with weights
- construct the minimum spanning tree including weightings and calculate its length
- demonstrate understanding of the terms from the network topic.

Areas for students to improve include:

- ensuring there is an understanding of the terms used in the topic, for example, the difference between a spanning tree and a minimum spanning tree
- completely answering the question by checking all components have been addressed, such as labelling weightings and calculating the length.

Question 21

Students should:

- be able to perform percentage calculations
- understand and operate with the concept of commission.

In better responses, students were able to:

- calculate 2% of the first 800 000 and 1.5% of the other 700 000, then add to find the total commission.

Areas for students to improve include:

- understanding the concept of commission and the need to apply different percentages to different components of the sale price

- calculating the percentage of an amount.

Question 22

Students should:

- know how to convert between units of measurement
- evaluate if the cost is realistic for running the air conditioning system for a seven-day period.

In better responses, students were able to:

- convert watts to kilowatts and cents to dollars
- correctly calculate the cost for a seven-day period.

Areas for students to improve include:

- distinguishing between which values need to be multiplied (hours x days) and which need to be divided (watts to kilowatts and cents to dollars)
- understanding that cost of electricity is related to time and wattage of use
- showing all working.

Question 23

Students should:

- be able to plot points correctly from a table
- draw and read from the line of best fit by eye.

In better responses, students were able to:

- plot points correctly
- draw a straight line of best fit by eye using a ruler and read accurately from it.

Areas for students to improve include:

- reading points correctly from a table
- drawing a correct line of best fit by eye using a ruler
- providing a single value for the estimated value from their line, rather than a range of possible values.

Question 24

Students should:

- be able to calculate future value using the formula
- be able to calculate simple interest.

In better responses, students were able to:

- apply the future value formula to calculate the interest earned on an investment
- calculate interest using both the simple interest formula and the future value formula.

Areas for students to improve include:

- converting percentages into decimal form
- understanding that compounding interest is found by using the future value formula.

Question 25

Students should:

- associate break-even point with the point of intersection
- be able to calculate a profit
- be able to read the scale on a graph.

In better responses, students were able to:

- indicate on the graph the break-even point
- substitute correctly into the equations for R and C, then subtract them.

Areas for students to improve include:

- understanding the meaning and significance of a break-even point
- substituting into and evaluating the formula
- reading values off a graph using the correct scale.

Question 26

Students should:

- be able to identify the number of days and to what the interest is calculated.

In better responses, students were able to:

- correctly calculate the number of days
- calculate the correct daily interest rate
- subtract the repayment after interest has occurred.

Areas for students to improve include:

- using the Reference Sheet and identifying the future value formula
- applying the future value formula with correct interest rate and days in correct positions in the formula
- showing that repayments are subtracted from the amount owing to get the balance, whilst interest is added.

Question 27

Students should:

- know the area of a triangle formula and how to apply it
- be able to convert units, such as m^2 to hectares.

In better responses, students were able to:

- use the perpendicular height and base of the triangle to calculate the area in square metres
- successfully convert square metres to hectares and then find the correct cost.

Areas for students to improve include:

- showing all relevant working out
- knowing and applying the area of a triangle formula
- converting between square metres and hectares.

Question 28

Students should:

- be familiar with tax tables
- calculate taxable income after adding contributions and subtracting allowable tax deductions from gross pay
- use the appropriate tax bracket in the table to calculate the income tax
- be able to manage values in cents and dollars.

In better responses, students were able to:

- calculate taxable income from income and deductions
- identify the correct tax rates and clearly calculate the tax payable
- show full and correct working with all their tax calculations.

Areas for students to improve include:

- knowing the order of the calculations and apply brackets where needed
- changing the 32.5 cents into 0.325 dollars
- knowing the difference between an income and a deduction
- understanding how to calculate taxable income
- setting out calculations in a clear, logical progression
- checking the reasonableness of their answer.

Question 29

Students should:

- understand what an outlier is
- use the outlier formula provided on the Reference Sheet
- be able to calculate interquartile range using the upper and lower quartiles.

In better responses, students were able to:

- find the interquartile range from a list of scores
- use the formula to conclude that 59 is an outlier
- calculate the interquartile range.

Areas for students to improve include:

- using the formula on the Reference Sheet to show 59 is an outlier, rather than relying on the 'gap' between 59 and the number preceding it
- understanding how an outlier is defined using the formula
- knowing the difference between range and interquartile range
- justifying conclusions using mathematical reasoning.

Question 30

Students should:

- know the difference between declining balance and straight-line depreciation and how to compare the two methods
- be able to apply (subtract) a given amount of depreciation multiple times
- plot the straight-line method on the graph which already contains the declining balance method.

In better responses, students were able to:

- complete the straight-line depreciation table and plot the points
- continue the straight-line depreciation method until the value matched the declining balance value
- read and interpret the point of intersection from the graph.

Areas for students to improve include:

- understanding the difference between straight-line and declining balance depreciation
- plotting points on a set of axes in a practical context
- interpreting the point of intersection of two graphs in a practical context.

Question 31

Students should:

- recognise that appreciation is an application of the compound interest formula.

In better responses, students were able to:

- use the compound interest formula to find the principal/original value
- understand what appreciation means in the context of financial maths.

Areas for students to improve include:

- converting percentages into decimal form
- knowing when to use the compound interest formula instead of simple interest formula.

Question 32

Students should:

- be able to identify the two right triangles from the diagram
- be able to use trigonometric ratios correctly
- be able to use trigonometry to find a missing side in a triangle, and then use this value to perform subsequent calculations in the second triangle.

In better responses, students were able to:

- perform simple right-angled trigonometry calculations
- use the angle sum of a triangle and supplementary angles.

Areas for students to improve include:

- practising algebra skills to perform a correct rearrangement of the trigonometric ratio to calculate the missing side and angle, particularly with the unknown on the denominator
- practising two-triangle problems
- using the labels from the diagram to identify the side or angle they are finding.