

Mathematics Standard 1

HSC Marking Feedback 2021

Question 11

Students should:

- understand the concept of 'best buy' and how to use rates to determine the quantity that delivers this
- choose an appropriate weight from the selection given and use it to determine equivalent rates.

In better responses, students were able to:

- calculate and identify the price per 100 grams for each of the packets
- identify the correct option based upon their calculations.

Areas for students to improve include:

- reading the question carefully to identify what unit each amount needs to be compared with
- justifying their final selection with supporting calculations.

Question 12

Students should:

- calculate GST and add it to the pre-GST value
- determine the total cost of the program
- calculate the profit by finding the difference between income and costs.

In better responses, students were able to:

- correctly and clearly identify total costs and income
- show correct expressions to identify profit as total income minus total costs.

Areas for students to improve include:

- calculating the GST component and when this needs to be added
- clearly identifying how they have found their profit
- separating each cost or income component and finding their total as separate calculations rather than as a single value
- understanding that profit is not just income.

Question 13

Students should:

- calculate the amount fuel used for the trip
- calculate the fuel cost
- use multiplication and division appropriately
- show all calculation steps.

In better responses, students were able to:

- realise when multiplication was needed and when division was needed to calculate the fuel cost
- avoid rounding answers as they worked through the question so that they could calculate the exact cost
- set out their solutions neatly.

Areas for students to improve include:

- realising the need to multiply by the cost per litre rather than to divide by it to calculate fuel cost
- thinking about why they are performing a calculation such as dividing a total capacity by a cost.

Question 14

Students should:

- use the compound interest formula to calculate an inflated value
- recognise inflation as an application of the future value or compound interest formula.

In better responses, students were able to:

- use the formula correctly
- calculate the values based on their formula correctly
- apply repeated percentage change if not using the formula
- convert 3% and use as a fraction or decimal correctly when calculating.

Areas for students to improve include:

- knowing how to calculate a power using a calculator
- recognising that the compound interest formula applies to inflation problems
- understanding the use of power of 5 as opposed to multiplying by 5.

Question 15

Students should:

- use longitude difference when solving time zone problems
- relate time difference to longitude difference using division by 15
- determine which city is ahead of the other city using longitude values
- include both time *and* day when answering the question.

In better responses, students were able to:

- calculate the required time using longitude difference
- calculate the time difference
- correctly stated that time in Sydney time was ahead of time in Sweden
- draw a simple timeline sketch or coordinate sketch to assist their calculations.

Areas for students to improve include:

- understanding that only longitude difference is relevant for time calculations
- understanding why division by 15 is used
- reading the question carefully and remembering to state day and time when both are required
- avoiding being put off by a question with words and trying to attempt it.

Question 16

Students should:

- isolate the term in $2r$
- divide both sides of the equation by 2.

In better responses, students were able to:

- subtract 10 from both sides of the equation correctly
- divide both sides of the equation by 2 correctly
- recognise that multiplication connected the coefficient and pronumeral r .

Areas for students to improve include:

- understanding what a linear equation means
- knowing that changing the subject of a formula is not the same as substituting values into the formula
- having a sense of how to do the same operation to both sides of a linear equation.

Question 17

Students should:

- understand that a spanning tree contains no cycles
- make use of the existing network diagram by highlighting or drawing on it
- clearly label edges and vertices
- realise that the shortest path may not be a subset of the minimum spanning tree.

In better responses, students were able to:

- indicate or draw a network diagram without cycles
- locate the minimum spanning tree as opposed to an alternate spanning tree
- clearly indicate edge weights and vertices
- list and show working for the different paths to get from Q to U before stating the shortest path total
- calculate the minimum length.

Areas for students to improve include:

- knowing the difference between a spanning tree and the minimum spanning tree
- reading the question carefully to see that the shortest route was required and clearly indicating this
- using clear diagrams with labels to communicate their answer
- using a system to ensure they have found the minimum spanning tree. For example, starting with a node when using Prim's algorithm; starting with the smallest edge when using Kruskal's algorithm.

Question 18**Students should:**

- plot the missing points using the names of the axes as a guide
- use a ruler to draw a line of best fit
- understand that the line of best fit does not pass through all points and is not drawn by joining all the dots
- understand that a decreasing line has a negative gradient
- understand the relationship between the relative location of the points and the line of best fit
- locate the appropriate set of scores and determine their average.

In better responses, students were able to:

- plot points correctly
- draw the line of best fit by eye
- clearly describe the form, direction, and strength of the association
- find the average by adding values together, using brackets, then dividing.

Areas for students to improve include:

- determining the placement of a line of best fit for a set of points
- knowing the difference between mean and median
- understanding the meaning and the language used to describe the association of points on a scatterplot in relation. In this case, positive or negative direction, and weak, moderate or strong association.

Question 19**Students should:**

- interpret information from the straight-line depreciation graph
- determine the depreciation for a given time
- find the value of the car
- identify limitations in a linear model in a particular context.

In better responses, students were able to:

- identify values from a graph
- convert months to years

- recognise when the asset would have a negative value.

Areas for students to improve include:

- understanding the units or scale used on a graph
- relating mathematical models to real life situations.

Question 20

Students should:

- find the probability of an event from a given sample space using the number of favourable outcomes and the number of possible outcomes
- calculate the probability of the complementary event.

In better responses, students were able to:

- find the probabilities by considering the sample space
- use a complementary probability argument correctly.

Areas for students to improve include:

- understanding that probabilities lie between 0 and 1
- understanding that when all outcomes are equally likely, the probability of an event can be calculated as the number of outcomes favourable to that event divided by the total number of possible outcomes
- applying the concept of probability in simple contexts.

Question 21

Students should:

- calculate the perimeter of the sportsground using the given scaleshow all calculation steps.

In better responses, students were able to:

- use the unitary method to simplify rates
- accurately convert rates
- work through the multiple steps needed and communicate each of these steps clearly with working.

Areas for students to improve include:

- using a scale effectively
- converting a distance and time into an appropriate rate
- looking at the reasonableness of final answers as a guide as to whether their calculations are correct
- writing logical and systematic working when dealing with a multi-step question.

Question 22

Students should:

- include the units of measurement when solving problems involving rates
- combine the information about two separate rates into mL/min
- use their answer for part (a) to create a rate in L/h and then use the unitary method to find the time taken to collect 9 L.

In better responses, students were able to:

- use rate notation in their working
- calculate the number of seconds in 24 hours and then apply the given rates with division
- divide 9 by the answer in part (a).

Areas for students to improve include:

- converting between mL and L
- using units as part of solutions
- manipulating rates in problem solving contexts.

Question 23

Students should:

- interpret travel graphs (distance-time graphs)
- draw a travel graph
- solve a problem by comparing graphs.

In better responses, students were able to:

- identify rest breaks on a distance-time graph
- identify and describe the fastest speed as having the steepest gradient
- draw a line graph that represents a constant speed
- identify and determine differences in two distance-time graphs.

Areas for students to improve include:

- reading and interpreting the scale on the axis of a graph
- identifying that gradient is related to speed
- drawing a straight-line graph from given information.

Question 24

Students should:

- recognise which values in the building plan indicate the internal or external walls
- convert between measurement units
- calculate the area of plane figures and realise when an area is not to be included in the final cost calculation.

In better responses, students were able to:

- identify the correct values from the diagram and convert these into metres
- calculate the area of the floor and subtract the area that is not to be carpeted
- round up the area to calculate the total cost.

Areas for students to improve include:

- finding areas of plane shapes
- identifying when to subtract a value that can minimise the costs
- knowing when to round up their answer to a whole number in a range of situations
- applying mathematical skills to real world problems.

Question 25

Students should:

- recognise that different shapes will fill at different rates
- identify which shapes will fill faster than others
- use a ruler when constructing a graph that forms a linear relationship.

In better responses, students were able to:

- draw straight lines that increased with a positive gradient
- recognise that the rate at which the water filled the containers could be represented by linear relationships.

Areas for students to improve include:

- identifying the relationship between the rate at which an object fills and its cross-sectional area
- understanding how the rate at which an object fills differs between shapes.

Question 26

Students should:

- use the scale factor to find the unknown lengths in the larger shape
- use the areas of the triangle and rectangle to find the area of the composite shape.

In better responses, students were able to:

- calculate the area of the composite shape
- convert measurements by a scale factor
- show area calculations for rectangles and triangles.

Areas for students to improve include:

- calculating dimensions of similar shapes using a scale factor
- showing their working and calculations when solving problems
- deconstructing a composite shape to calculate the areas of simpler shapes.

Question 27

Students should:

- find 0.25% of \$678 833.09
- interpret the context of the loan repayment table, realising that interest is added to the principal and then the repayment is subtracted
- understand that the term of a loan would reduce because there is less interest charged and thus less interest to repay.

In better responses, students were able to:

- understand and show how loan repayments work
- correctly calculate interest, add it to the amount owing and subtract the repayment.

Areas for students to improve include:

- understanding finance terms, particularly the different between loans and investments
- reading the requirements of the question
- knowing that interest is added to the amount owing on a loan and the repayment is subtracted.

Question 28

Students should:

- either remember the trigonometry acronym SOHCAHTOA or use the Reference Sheet to confirm trigonometric ratios
- know that the side opposite the right angle, the hypotenuse, is always the longest side
- use the correct and appropriate area of a triangle formula.

In better responses, students were able to:

- clearly and correctly label the sides of the triangle
- use trigonometry to find the length of a shorter side
- use Pythagoras' theorem or trigonometry to calculate the length of the other shorter side
- recognise which sides represented the base and height of the triangle in order to find the area of the triangle.

Areas for students to improve include:

- identifying the side opposite the right angle as the hypotenuse
- writing the equation required to find the unknown side
- recognising that either Pythagoras theorem or trigonometry will be needed for problems concerning measurements in right-angled triangles
- recognising the side that appears to be on the bottom in the diagram, is not necessarily the base side of the triangle.

Question 29

Students should:

- know how to substitute numbers into an equation to find the points that lie on a line
- be familiar with graphing a linear equation, particularly when y is not the subject of the

equation

- understand that the solution for two simultaneous equations is the point of intersection of the two graphed lines
- plot a series of points and use a ruler to join them, to draw the equation of a line
- write an equation from a word description.

In better responses, students were able to:

- choose appropriate points to substitute into their equations to graph each equation
- interpret the 'correct' solution from 'incorrect' graphs and make the connection to the context of the question
- draw linear graphs neatly, with a ruler, and accurately find the point of intersection.

Areas for students to improve include:

- graphing straight lines when y is not the subject of the equation
- graphing neatly and accurately using a ruler and clearly defined points
- being able to accurately interpret the solution in the context of the question including reading off correct values for x for goannas and y for emus
- being able to break down a multi-step question into smaller parts or processes.

Question 30

Students should:

- calculate the number of days for which interest is charged
- divide the given annual interest rate by 365 to get a daily rate
- use compound interest to find the future value
- subtract the principal to calculate interest charged.

In better responses, students were able to:

- divide the annual interest rate by 365
- apply the compound interest formula correctly
- subtract \$850 from their future value amount
- calculate 3% of their future value amount.

Areas for students to improve include:

- reading and interpreting the question
- calculating the number of days for which interest would be charged
- finding the percentage of an amount
- being familiar with the terminology and language of questions which involve credit cards.