Mathematics Standard 1

HSC Marking Feedback 2020

Question 11

Students should:

- recognise the symbol θ as an indicator of a trigonometric question
- label the three sides of their triangle as opposite, adjacent and hypotenuse
- show all their working.

In better responses, students were able to:

- show structured setting out using $\tan \theta = \frac{8}{10}$ or $\theta = \tan^{-1}\left(\frac{8}{10}\right)$
- use Pythagoras' theorem correctly.

Areas for students to improve include:

- identifying the correct trigonometric ratio for the given sides, using the Reference Sheet
- showing working out of their calculations to be awarded some marks in the case of a wrong answer, especially the square root step.

Question 12

Students should:

- identify what is required to be calculated
- recognise that a saving involves a subtraction.

In better responses, students were able to:

- calculate the cost of both painters over the same area and find the $200 saving.

Areas for students to improve include:

- reading the question carefully to identify that the saving, not just the cost of each painter, is required.

Question 13

Students should:

- understand the difference between present and future value
- practice working with exponential equations.

In better responses, students were able to:

- recognise that present value required the compound interest formula

- manipulate the compound interest formula correctly to find the present value.

Areas for students to improve include:

- using their calculators correctly for exponential calculations
- understanding the difference between simple interest and compound interest.

Question 14

Students should:

- make sure they answer all parts of the question, especially when asked to complete their response on the grid provided.

In better responses, students were able to:

- calculate the distance travelled and explain the change in speed
- complete the travel graph using two linear functions.

Areas for students to improve include:

- reading and understanding non-linear travel graphs
- using appropriate language to explain changes in speed.

Question 15

Students should:

- be able to add 9 hours flight time onto a departure time
- understand the difference between am and pm.

In better responses, students were able to:

- convert the departure time and add the flight time to give the correct answer.

Areas for students to improve include:

- realising that 10 hours behind UTC and 11 hours ahead of UTC means a 21 hour time difference
- using the calculator with time calculations.

Question 16

Students should:

- know that $3R$ means $3 \times R$
- show their substitution into a given formula before proceeding with the calculation
- avoid leaving out any parts of the formula in their working out.

In better responses, students were able to:

- substitute 10 in the formula to replace R
- perform the correct order of operations to evaluate m correctly.

Areas for students to improve include:

- using their calculator accurately and transferring their response correctly onto the paper

▪ recognising that numbers in the denominator of a fraction must be included in the denominator for the final calculation.

Question 17

Students should:

▪ show structured setting out for all three steps
▪ place their answers into their table to help them understand what their next step should be.

In better responses, students were able to:

▪ identify the steps required for the solution: finding 20% of $510, using subtraction to find savings of $58, and using division to calculate 85 weeks.

Areas for students to improve include:

▪ learning how to read lengthy questions carefully using strategies such as underlining or highlighting
▪ labelling their numerical response with the appropriate word, for example, $\text{savings} =$, to identify what their number is related to.

Question 18

In better responses, students were able to:

▪ choose the correct values for u and v from the question and substitute these into the formula provided
▪ correctly square the values for u and v
▪ solve the equation following substitution.

Areas for students to improve include:

▪ solving equations following substitution with squared terms and the subject on the left-hand side of the equation.

Question 19

In better responses, students were able to:

▪ complete the table of values with the correct numbers
▪ accurately plot some of the points generated from their table
▪ identify that the plot follows an exponential model given the choice between linear or exponential.

Areas for students to improve include:

▪ ensuring accuracy when plotting points on a number plane
▪ expressing an understanding of exponential growth as an increasing amount of growth year upon year.

Question 20

Students should:

- understand that to show $k = 0.005$, they need to use the formula and derive the value
- recognise that parts of questions are connected. In this case part (b) needs part (a).

In better responses, students were able to:

- show that $k = 0.005$ either by substitution or by rearrangement
- write a correct equation and solve it to find $N = 240$.

Areas for students to improve include:

- substituting the correct numerical values into a given formula
- rearranging formulae.

Question 21

Students should:

- label every vertex with a letter and every edge with a number on a network diagram
- remember that a spanning tree cannot include a cycle
- add up all weights on edges to find the total.

In better responses, students were able to:

- neatly draw and label their spanning tree
- choose the smallest number for each step as they created their minimum spanning tree
- correctly add their weights to have a length of 14
- correctly add $14 + 10 = 24$ in part (b).

Areas for students to improve include:

- checking their addition using a calculator
- labelling all vertices with a letter and all edges with a number (weight)
- showing their working $14 + 10$, for their minimum spanning tree.

Question 22

Students should:

- bring a ruler to the examination
- draw their lines using a ruler.

In better responses, students were able to:

- identify data in the scatterplot as having a strong negative correlation
- draw a line of best fit which passing through points in the centre of the scatterplot and read information from their graph
- express the understanding that extrapolation beyond the scope of the data set was inappropriate.

Areas for students to improve include:

- understanding statistical terms including extrapolation
- drawing a line of best fit using a ruler

- recognising that the range of a dataset is a single value, and how to calculate it from a set of given data.

Question 23

Students should:

- bring a ruler as diagrams drawn to scale require measurement
- be able to apply a variety of scales in practical situations.

In better responses, students were able to:

- find the correct side length and area
- use the given value of $100 to find the cost of the carpet.

Areas for students to improve include:

- recognising the difference between area and perimeter
- avoiding the assumption that a shape is a square when only one measurement is provided in the question.

Question 24

In better responses, students were able to:

- arrange scores in ascending order and select the two middle scores to average for the median
- show their understanding of the concept of standard deviation by linking it to the spread of the ages in the dataset.

Areas for students to improve include:

- understanding the meaning and process for calculating the median
- reading questions carefully and selecting the key words, then checking they have answered what has been asked.

Question 25

Students should:

- read the question carefully, ensuring they follow the instructions of sketching Option A
- use a ruler for linear graphs.

In better responses, students were able to:

- sketch a straight line representing the simple interest Option A and find the correct difference of $200.

Areas for students to improve include:

- reading the question carefully and following the instructions given
- understanding the difference between simple interest and compound interest graphs and being able to sketch both.

Question 26

In better responses, students were able to:

- complete the table representing the probability experiment
- calculate the correct probability.

Areas for students to improve include:

- understanding the complement of an event and how it is calculated.

Question 27

Students should:

- be able to identify the correct row in a tax table and calculate the tax payable
- understand that an annual amount involves the conversion of monthly to yearly by multiplying $3000 by 12.

In better responses, students were able to:

- identify the correct tax rates and clearly calculate the tax to be $32 888.60
- recognise that a refund involves subtraction and calculate the answer of $36 000 − $32 888.60 = $3111.40.

Areas for students to improve include:

- identifying the terms relating to tax calculations and knowing when to calculate the taxable income and when it is already given in the question
- using the correct order of operations when calculating their tax from a table
- understanding that the subtraction of PAYG must be performed after their tax calculation, not before.

Question 28

Students should:

- recognise applications of scale drawings in everyday life
- be able to find the area of a triangle.

In better responses, students were able to:

- use the given area to find the value of the height $BC = 5$ in Triangle I
- apply a ratio to find determine a missing side
- use Pythagoras' theorem or trigonometry to calculate a side in a triangle.

Areas for students to improve include:

- knowing a variety of strategies to solve questions requiring multiple techniques.

Question 29 (common question with Standard 2 and Advanced)

Students should:

- remember to bring a ruler to the examination
- read the question carefully and answer what is being asked.

In better responses, students were able to:

- draw a straight line joining $(0,1000)$ to $(50,0)$
- graph a straight line from $(15,0)$ passing through $(35, 600)$ or similar, to represent the volume of Tank B as $V(B) = 30t - 450$.
- read the point of intersection of the two correct graphs and state $t = 29$.

Areas for students to improve include:

- practising accuracy and care with constructions
- reading the question carefully and answering what is being asked. Students tried to give the two times where both tanks contained 1000 litres rather than giving the time for the combined volume of 1000 litres to occur.

Question 30

Students should:

- recognise that when 4 marks are allocated, a question requires multiple steps
- set out their calculations in a clear, organised manner and use words to label what each calculation represents
- check that their answer makes sense.

In better responses, students were able to:

- select the correct rate and term for both the interest and salvage value calculations
- determine the correct amount owing on the loan and the final amount left over.

Areas for students to improve include:

- structuring their setting out of multiple calculations
- understanding the difference between simple interest, compound interest and depreciation.