MA99 EDUCATION

Mathematics Standard 2: Practice Paper 1

01

NSW MATHEMATICS STANDARD 11-12 SYLLABUS 2024

FOR HSC 2027 AND LATER

General Instructions

- Reading time: 10 minutes
- Working time: 2 hours and 30 minutes
- Write using black pen
- Calculators approved by NESA may be used
- The NESA Mathematics Standard 1 and Standard 2 reference sheet may be used.
- From Question 16 on, show your mathematical reasoning and/or calculations in every answer

Total marks: 100

Section I · 15 marks

Questions 1 to 15

Suggested time: about 25 minutes

Section II · 85 marks

Questions 16 to the end. Suggested time: about 2 hours 5 minutes.

Year 11 work is assumed, and questions can draw on it.

This paper examines the Year 12 Mathematics Standard 2 course (2024 syllabus), with the Year 11 course as assumed knowledge, in the proportions of an HSC paper. The questions are set in a town on the NSW South Coast. Formulas that are not on the reference sheet are given in the question that needs them.

Marks may be deducted for careless or badly arranged work.

Section I · Answer Sheet

Shade ONE circle for each of Questions 1 to 15. If you change your mind, draw a cross through the incorrect answer and shade the new one.

1	A	B	C	D	2	A	B	C	D
3	A	B	C	D	4	A	B	C	D
5	A	B	C	D	6	A	B	C	D
7	A	B	C	D	8	A	B	C	D
9	A	B	C	D	10	A	B	C	D
11	A	B	C	D	12	A	B	C	D
13	A	B	C	D	14	A	B	C	D
15	A	B	C	D					

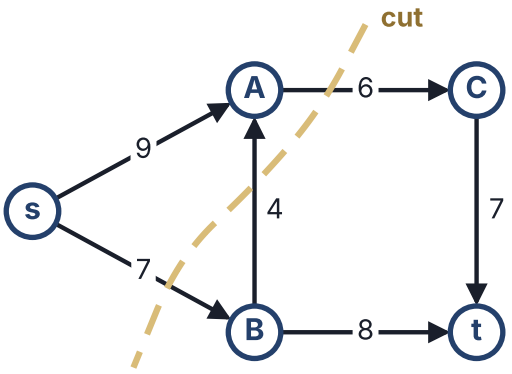
Section I · 15 marks

Answer Questions 1 to 15 on the multiple choice answer sheet, spending about 25 minutes on this section.

Question 1

1 MARK

The directed network shows the capacities, in litres per second, of the pipes that carry water from a tank, s, to the showers, t, at a surf club. A cut is shown as a dashed line.



Pipe capacities in litres per second

Question

What is the capacity of the cut?

A 9
B 13
C 16
D 17

Question 2

1 MARK

A whale-watching boat from Eden recorded whale sightings on 238 of its 280 cruises last season. Using relative frequency, what is the best estimate of the probability that no whale is sighted on a cruise?

A 0.15
B 0.18
C 0.85
D 1.18

Question 3

1 MARK

A bushwalking map has a scale of 1 : 25 000. On the map, a coastal track is 7.2 cm long. What is the actual length of the track?

A 0.18 km
B 1.8 km
C 18 km
D 180 km

Question 4

1 MARK

A kayak hire business at Narooma charges C dollars to hire a kayak for h hours, where $C = 18h + 25$. Which of the following statements is true?

A Hiring a kayak for 3 hours costs \$79.

B Each extra hour of hire costs \$25.

C The fixed booking fee is \$18.

D Hiring a kayak for 2 hours costs \$86.

Question 5

1 MARK

The true bearing of a lighthouse, L, from a fishing boat, B, is 327°. What is the compass bearing of the boat from the lighthouse?

A N33°W

B N57°W

C S57°E

D S33°E

Question 6

1 MARK

Mel invests \$12 000 in a term deposit that pays simple interest at 4.2% per annum. How much interest does she earn in 9 months?

A \$376.05

B \$378.00

C \$504.00

D \$4536.00

Question 7

1 MARK

For holiday units in a coastal town, Pearson's correlation coefficient between the distance of a unit from the beach (in km) and its weekly rent (in dollars) is $r = -0.83$. Which statement is correct?

A There is a strong negative linear association: units further from the beach tend to have lower rents.

B There is a weak negative linear association, because r is less than zero.

C There is a strong positive linear association, because 0.83 is close to 1.

D Moving a unit further from the beach causes its rent to fall.

Question 8

1 MARK

The masses of rock lobsters caught by a fishing co-operative are normally distributed with a mean of 1.2 kg and a standard deviation of 0.15 kg. What percentage of the lobsters have a mass between 1.05 kg and 1.5 kg?

A 47.5%

B 68%

C 81.5%

D 95%

Question 9

1 MARK

The time, T hours, taken to pump the water out of a flooded boat shed varies inversely with the number of pumps, n, used. With 3 pumps it takes 8 hours. How long does it take with 4 pumps?

A 6 hours

B 7 hours

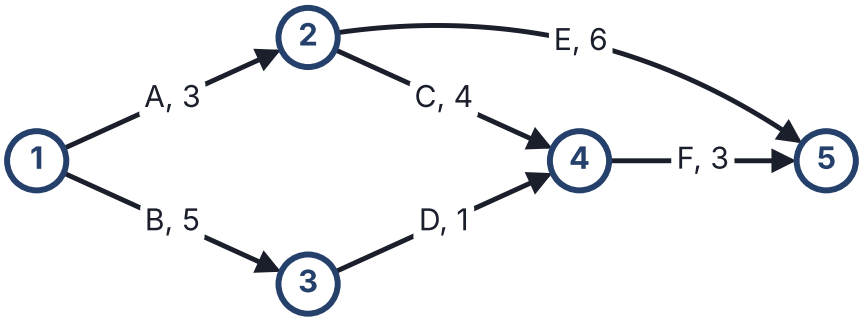
C 10 hours 40 minutes

D 24 hours

Question 10

1 MARK

The network shows the activities in a project and their durations in days.



Activities and durations in days

Question

What is the minimum time needed to complete the project?

A 7 days
B 9 days
C 10 days
D 22 days

Question 11

1 MARK

A desalination plant produces 15 ML of drinking water each day. What is this amount in litres, written in scientific notation?

A 1.5×10^4 L
B 1.5×10^6 L
C 1.5×10^7 L
D 1.5×10^{10} L

Question 12

1 MARK

Mia deposits $400 at the end of every quarter into an account that earns interest at 6% per annum, compounded quarterly. The table shows future value interest factors for an annuity of $1 per period.

NUMBER OF PERIODS	1.5% PER PERIOD	6% PER PERIOD
3	3.0452	3.1836
4	4.0909	4.3746
12	13.0412	16.8699

Question

What is the future value of Mia's annuity after 3 years?

A $1273.44
B $5093.76
C $5216.48
D $6747.96

Question 13

1 MARK

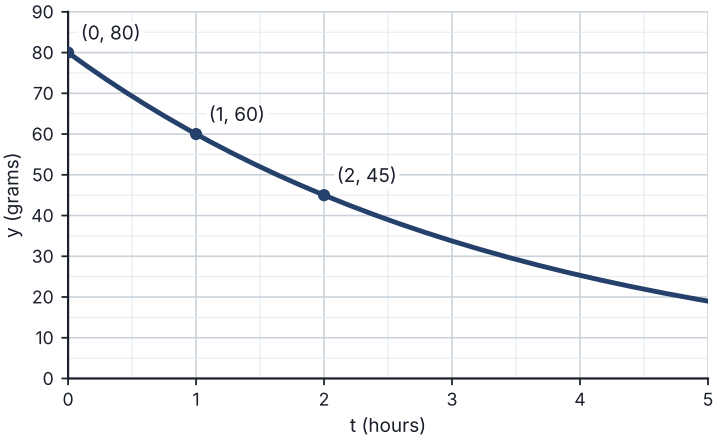
A 2400 W pool heater at a holiday park runs for 5 hours each day for 30 days. Electricity costs 34 c per kilowatt hour (a hypothetical tariff). What is the cost of the electricity used by the heater?

A $4.08
B $122.40
C $12 240.00
D $122 400.00

Question 14

1 MARK

A dye is released into a tidal rock pool. The graph shows the amount of dye, y grams, left in the pool t hours after it is released.



Dye left in the rock pool

Question

Which equation could model the amount of dye left in the pool?

A $y = 80 - 20t$
B $y = 60(0.75)^t$
C $y = 80(1.25)^{-t}$
D $y = 80(0.75)^t$

Question 15

1 MARK

A surf club has 10 volunteers on patrol, and 3 of them hold a rescue boat licence. Two of the volunteers are chosen at random to crew the rescue boat. What is the probability that exactly one of the two holds a rescue boat licence?

A $\frac{21}{100}$
B $\frac{7}{30}$
C $\frac{21}{50}$
D $\frac{7}{15}$

Section II · 85 marks

Answer Questions 16 to 40 in the spaces provided, spending about 2 hours 5 minutes on this section. Show your mathematical reasoning and/or calculations in every answer.

Question 16 · 2 marks

Fisheries officers want to estimate the number of flathead in a coastal lake. They catch, tag and release 150 flathead. Two weeks later they catch 120 flathead, and 18 of these are tagged.

Use the capture-recapture technique to estimate the number of flathead in the lake.

Question 17 · 2 marks

Lena buys 1200 shares in a fishing company at $3.85 per share. Her broker charges brokerage of 0.6% of the value of the shares (a hypothetical rate). The company then pays a dividend of 21 cents per share.

Calculate the total cost of buying the shares, and the dividend yield based on the price Lena paid per share, correct to one decimal place.

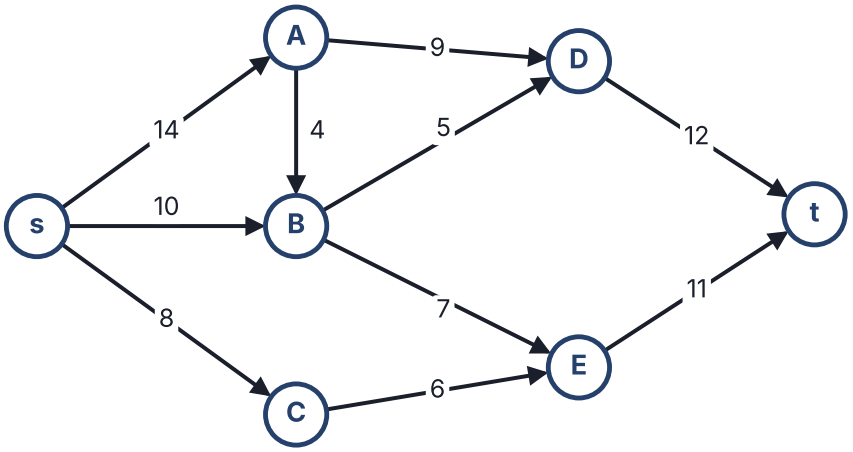
Question 18 · 4 marks

Jai is a deckhand on a fishing trawler. Under his work agreement (hypothetical), he is paid $31.60 per hour for the first 38 hours he works in a week, time-and-a-half for the next 4 hours, and double time for any hours after that. He is also paid a meal allowance of $16.80 for each day on which he works more than 10 hours.

One week Jai works 46 hours, and he works more than 10 hours on 3 of the days. Calculate his gross pay for the week.

Question 19 · 5 marks

The directed network shows the water mains from a reservoir, s, to a town, t. The capacities are in megalitres (ML) per day.



Capacities of the water mains in ML per day

(a) What is the greatest possible inflow to vertex E? 1 MARK

(b) Find the maximum flow from s to t. Justify your answer using a cut. 2 MARKS

(c) The main from E to t is replaced with one of capacity 15 ML per day. Find the new maximum flow from s to t, and explain why it is less than $12 + 15 = 27$ ML per day. 2 MARKS

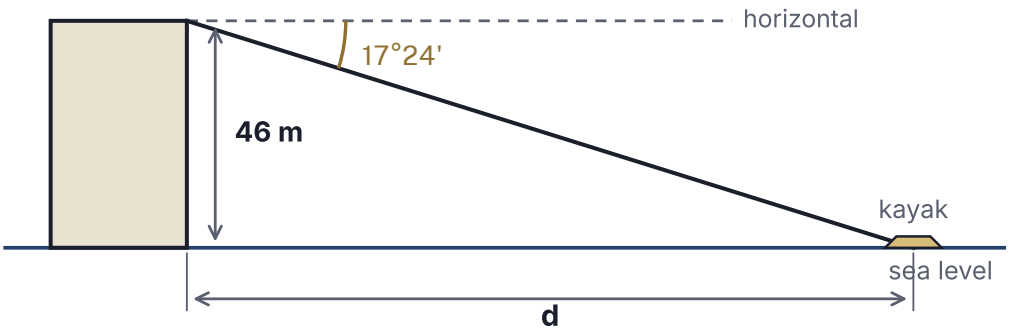
Question 20 · 3 marks

A surf school runs group lessons at \$55 each and private lessons at \$90 each. Over one weekend it ran 34 lessons and took \$2290.

By writing a pair of simultaneous equations, find the number of group lessons and the number of private lessons run that weekend.

Question 21 · 2 marks

From the top of a cliff 46 m above sea level, the angle of depression of a kayak is $17°24'$, as shown.



The cliff and the kayak (not to scale)

How far is the kayak from the base of the cliff, correct to the nearest metre?

Question 22 · 3 marks

Sydney time (which the NSW South Coast uses) is UTC$+10$, and UTC$+11$ during daylight saving, from the first Sunday in October to the first Sunday in April. Honolulu, in Hawaii, is UTC-10 all year.

A marine scientist in Eden starts a video call with a colleague in Honolulu at 7:30 am on Tuesday 10 November 2026, Eden time. What is the day and time in Honolulu when the call starts?

Question 23 · 6 marks

A beach kiosk recorded the maximum temperature, x °C, and the number of ice blocks sold, y, on 8 days.

DAY	MAXIMUM TEMPERATURE (°C)	ICE BLOCKS SOLD
1	21	46
2	24	61
3	25	52
4	27	70
5	29	79
6	31	84
7	33	98
8	35	97

(a) Calculate Pearson's correlation coefficient, r, correct to four decimal places, and describe the association between temperature and ice block sales. 2 MARKS

(b) Write down the equation of the least-squares regression line, with the gradient and the intercept correct to two decimal places, and interpret the gradient in this context. 2 MARKS

(c) Use the equation from part (b) to predict the number of ice blocks sold on a day with a maximum temperature of 42 °C. Comment on the reliability of this prediction. 2 MARKS

Question 24 · 4 marks

A charter boat business buys a new boat for $86 000.

(a) The boat is depreciated by the declining balance method at 18% per annum. Calculate its value after 5 years. 2 MARKS

(b) Under the straight-line method, the boat would instead lose $11 200 in value each year. After how many whole years is the straight-line value first lower than the declining balance value? Justify your answer with calculations. 2 MARKS

Question 25 · 3 marks

Two formulas for the dosage of a medicine for a child are

$$\text{Clark's formula: dosage} = \frac{\text{weight (kg)} \times \text{adult dosage}}{70}$$

$$\text{Young's formula: dosage} = \frac{\text{age (years)} \times \text{adult dosage}}{\text{age (years)} + 12}$$

The adult dosage of a medicine is 500 mg. A child is 6 years old and weighs 22 kg. Calculate the dosage for this child using each formula, and find the difference between them, correct to the nearest milligram.

Question 26 · 4 marks

Ella is saving for a boat. She will deposit $350 at the end of each month into an account earning 4.8% per annum, compounded monthly. The table shows future value interest factors for an annuity of $1 per period.

NUMBER OF PERIODS	0.3% PER PERIOD	0.4% PER PERIOD	0.5% PER PERIOD
12	12.2000	12.2676	12.3356
24	24.8465	25.1371	25.4320
36	37.9559	38.6381	39.3361
48	51.5451	52.8016	54.0978
60	65.6316	67.6602	69.7700

(a) Calculate the future value of Ella's annuity after 4 years. 2 MARKS

(b) Ella decides she needs $25 000 at the end of 5 years. Calculate the monthly deposit she needs to make at the same interest rate. 2 MARKS

Question 27 · 4 marks

At a seaside festival, 150 visitors were surveyed. 80 had swum at the beach, 50 had been whale watching and 30 had done both.

	WENT WHALE WATCHING	DID NOT GO WHALE WATCHING	TOTAL
Swam at the beach	30		80
Did not swim			
Total	50		150

(a) Complete the two-way table. 2 MARKS

(b) 3000 people are expected at next year's festival. Use the survey to estimate how many of them will have done exactly one of the two activities. 2 MARKS

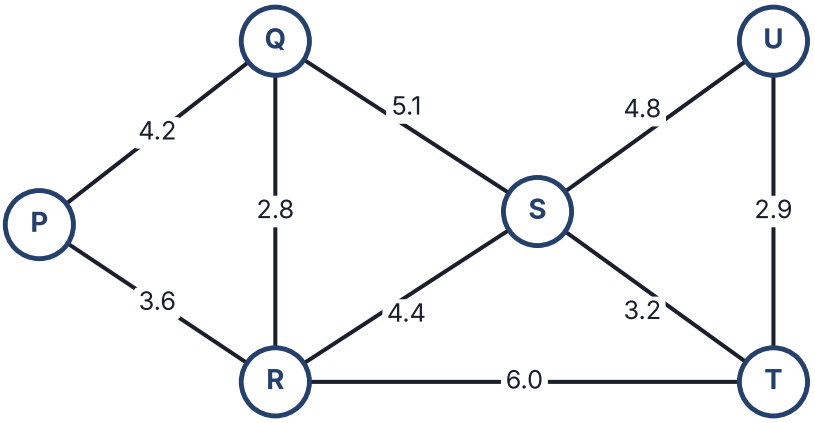
Question 28 · 2 marks

Harry's credit card charges interest from the day of each purchase, as there is no interest-free period. The rate is 21.9% per annum, compounded daily, and interest is added at the end of the statement period. He makes one purchase of $1260 and interest is charged on it for 20 days. He makes no payments in that time.

Calculate the interest charged on the purchase, using 365 days in a year.

Question 29 · 3 marks

A national park near the coast has six campsites, P, Q, R, S, T and U. The network shows the possible walking tracks between them, with lengths in kilometres. Rangers want to upgrade some tracks so that every campsite can be reached from every other, using the least total length of upgraded track.



Possible tracks between the campsites, in km

Find a minimum spanning tree for the network and the total length of track to be upgraded.

Question 30 · 5 marks

The surf club is getting ready for summer. The precedence table shows the activities involved.

ACTIVITY	DESCRIPTION	DURATION (DAYS)	IMMEDIATE PREDECESSORS
A	Clean out the boat shed	3	None
B	Order new rescue equipment	2	None
C	Repair the rescue boards	4	A
D	Repaint the clubhouse	6	A, B
E	Service the inflatable rescue boat	5	C
F	Install the new equipment	2	C, D
G	Final safety inspection	3	E, F

(a) Draw a network diagram to represent the project, using activities on the edges. Use dummy activities where they are needed. 2 MARKS

(b) Use forward and backward scanning to find the critical path and the minimum completion time. 2 MARKS

(c) Activity D is delayed by 2 days. What is the new minimum completion time? 1 MARK

Question 31 · 2 marks

A triangular area of sand dunes is fenced off to be replanted. Two of the fences are 38 m and 52 m long, and the angle between them is 116°. Calculate the area of the fenced-off region, correct to the nearest square metre.

Question 32 · 4 marks

In a surf lifesaving fitness test, candidates swim 400 m in a pool and complete a beach run. The times for each event are normally distributed. The swim has a mean of 7 minutes 20 seconds and a standard deviation of 25 seconds. The run has a mean of 9 minutes 10 seconds and a standard deviation of 40 seconds.

(a) Sam swims in 6 minutes 30 seconds and runs in 8 minutes 30 seconds. In which event did Sam perform better compared with the other candidates? Justify your answer using z-scores. 2 MARKS

(b) 400 candidates sat the test. Use the empirical rule to estimate how many swam faster than Sam. 2 MARKS

Question 33 · 2 marks

A surf shop sells a surfboard for \$935, including GST of 10%. In a sale, the price including GST is reduced by 15%. Calculate the amount of GST included in the sale price.

Question 34 · 3 marks

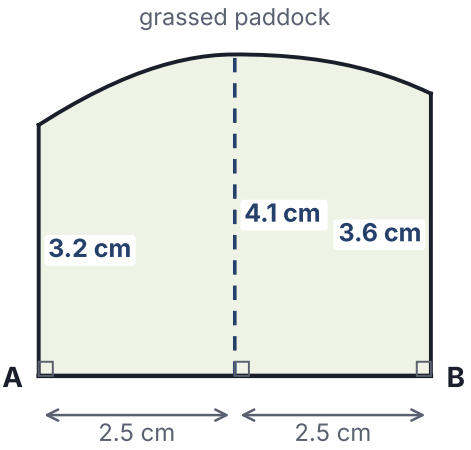
Kai borrows \$24 000 to buy a boat trailer and fishing gear. Interest is charged at 7.2% per annum, compounded monthly, on the balance owing at the start of each month (a hypothetical rate), and he repays \$750 at the end of each month. Part of the table modelling the loan is shown.

MONTH	OPENING BALANCE (\$)	INTEREST (\$)	REPAYMENT (\$)	CLOSING BALANCE (\$)
1	24 000.00	144.00	750.00	23 394.00
2	23 394.00	140.36	750.00	
3			750.00	
4			750.00	

Complete the table, and hence find the amount by which Kai has reduced the original $24 000 after four repayments.

Question 35 · 4 marks

The plan shows a grassed paddock behind the surf club, drawn to a scale of 1 : 2000. On the plan, AB is 5 cm long and the widths of the paddock are measured at right angles to AB at A, at the midpoint of AB and at B. The measurements on the plan are shown.



Plan of the paddock, scale 1 : 2000 (measurements on the plan in cm)

Use two applications of the Trapezoidal rule to find the actual area of the paddock. Hence calculate the volume of rain, in kilolitres, that falls on the paddock during a storm in which 12 mm of rain falls.

Question 36 · 2 marks

The number of rescues made each day at a beach was recorded for 40 days.

RESCUES IN A DAY	NUMBER OF DAYS
0	6
1	11
2	9
3	7
4	4
5	3

Find the median and the mean number of rescues per day.

Question 37 · 4 marks

The surf club sets up a stall at a festival to sell club T-shirts. Setting up the stall costs \$1800. Each T-shirt costs the club \$14 to print and sells for \$38.

(a) Write equations for the cost, C, and the income, I, from selling x T-shirts, and find the break-even point. 2 MARKS

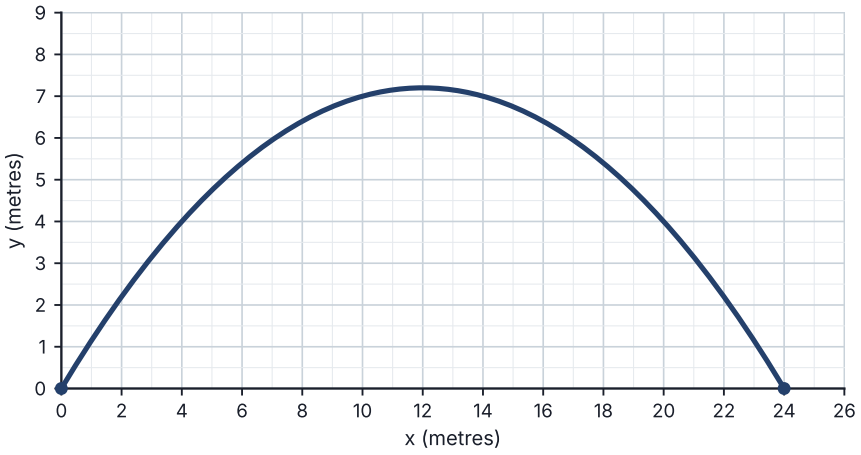
(b) Find the profit or loss if 60 T-shirts are sold, and the number of T-shirts that must be sold for a profit of \$1200. 2 MARKS

Question 38 · 3 marks

A closed cylindrical water tank at the surf club has a diameter of 1.8 m and a height of 2.2 m. The curved surface and the top of the tank are to be painted. One litre of paint covers 8 m^2, and paint is sold in 1 litre tins. How many tins of paint are needed? Justify your answer with calculations.

Question 39 · 4 marks

A ball is kicked on the beach. Its height above the sand, y metres, when it has travelled x metres horizontally is given by $y = -0.05x^2 + 1.2x$. The graph of this relationship is shown.



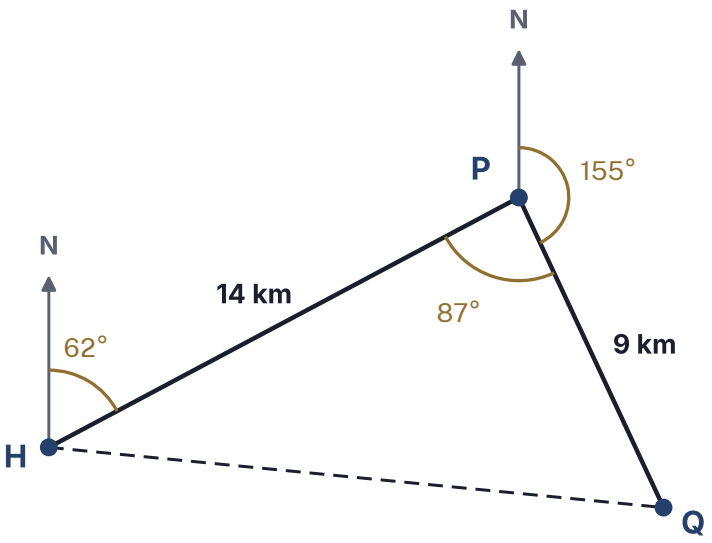
Height of the ball against horizontal distance

(a) Use the x-intercepts on the graph to find the axis of symmetry, and hence find the greatest height of the ball. 2 MARKS

(b) A fence 3 m high stands 22 m from where the ball is kicked, in the ball's path. Does the ball clear the fence? Justify your answer, and state the values of x for which the model is valid if the fence were not there. 2 MARKS

Question 40 · 5 marks

A fishing boat leaves the harbour, H, and travels 14 km on a bearing of 062° to P. It then travels 9 km on a bearing of 155° to Q, as shown. The angle HPQ is 87°.



The boat's course (not to scale)

(a) Find the distance HQ, correct to one decimal place. 2 MARKS

(b) Find the bearing of the harbour from Q, correct to the nearest degree. 3 MARKS

End of paper.

About this resource

MA99 EDUCATION

Scope

NSW Mathematics Standard 2, Year 12. Written to the NSW Mathematics Standard 11-12 Syllabus (2024), an HSC style paper on the whole course: the Year 12 focus areas, with the Year 11 course as assumed knowledge, for students sitting the HSC in 2027 and later years. Every value and solution was re-derived independently by computer algebra before printing. Contexts in the questions are invented unless a source is named.

Permitted use

Print it, annotate it and keep it on any device you own, for your own study.

Not permitted

Sharing, posting, selling or redistributing it, in whole or in part. Each copy is licensed to one student.

Copyright MA99 Education.
ma99education.com.au

MA99 EDUCATION

Mathematics Standard 2: Practice Paper 1 · Worked Solutions

01

NSW MATHEMATICS STANDARD 11-12 SYLLABUS 2024 FOR HSC 2027 AND LATER

Worked solutions · Section I

Each answer gives the working, the key and the error behind every wrong option. Section I is worth 15 marks, one for each question. The key is 1 B, 2 A, 3 B, 4 A, 5 D, 6 B, 7 A, 8 C, 9 A, 10 C, 11 C, 12 C, 13 B, 14 D, 15 D.

Question 1

The cut separates s and A (source side) from B, C and t (sink side). Count only the edges that cross from the source side to the sink side: sB (7) and AC (6). The edge BA crosses from the sink side back to the source side, so it is not counted.

Capacity of the cut $= 7 + 6 = 13$.

(B)

(A) subtracts the backward edge: $7 + 6 - 4 = 9$; a backward edge is ignored, not subtracted. (C) is the capacity of the edges leaving the source, $9 + 7$: that is a different cut. (D) adds the backward edge: $7 + 6 + 4 = 17$.

Question 2

No whale was sighted on $280 - 238 = 42$ cruises, so the estimate is $\dfrac{42}{280} = 0.15$.

(A)

(B) divides by the wrong total: $\dfrac{42}{238} \approx 0.18$. (C) is the probability that a whale is sighted. (D) divides the wrong way, $\dfrac{280}{238} \approx 1.18$: a probability is never greater than 1.

Question 3

Actual length $= 7.2 \times 25\,000 = 180\,000$ cm $= 1800$ m $= 1.8$ km.

(B)

(A) divides 180 000 cm by 1 000 000. (C) divides by 10 000 instead of 100 000 (there are 100 000 cm in a kilometre). (D) treats the 180 000 as metres.

Question 4

$C = 18 \times 3 + 25 = 79$, so 3 hours costs \$79. The 18 is the cost per hour (the gradient) and 25 is the fixed fee (the intercept).

(A)

(B) and (C) swap the meanings of the gradient and the intercept. (D) adds the fee for each hour: $2 \times (18 + 25) = 86$; the fee is paid once.

Question 5

The bearing of the boat from the lighthouse is the reverse bearing: $327^\circ - 180^\circ = 147^\circ$. This is $180^\circ - 147^\circ = 33^\circ$ east of south: S33°E.

(D)

(A) is the bearing of the lighthouse from the boat, 327°, in compass form: the direction was not reversed. (B) measures 57° from west instead of 33° from north, and is also not reversed. (C) reverses the direction but measures the angle from east instead of from south.

Question 6

$I = Prn = 12\,000 \times 0.042 \times \dfrac{9}{12} = 378$, so the interest is \$378.00.

(B)

(A) uses compound interest, $12\,000(1.042^{0.75} - 1) \approx 376.05$; a term deposit here pays simple interest. (C) is a full year's interest. (D) uses $n = 9$, treating months as years.

Question 7

The sign of r gives the direction (negative: rent falls as distance rises) and its size, 0.83, close to 1, gives a strong linear association.

(A)

(B) confuses the sign with the strength: a negative r can be strong. (C) ignores the sign. (D) claims causation; a correlation alone does not show that distance causes the change in rent (newer or larger units, for example, may be built in different places).

Question 8

$z = \dfrac{1.05 - 1.2}{0.15} = -1$ and $z = \dfrac{1.5 - 1.2}{0.15} = 2$. By the empirical rule, 34% of the data lie between $z = -1$ and 0, and 47.5% between 0 and 2.

Percentage $= 34\% + 47.5\% = 81.5\%$.

(C)

(A) counts only the part above the mean. (B) treats the interval as one standard deviation either side of the mean. (D) uses two standard deviations either side, but 1.05 kg is only one standard deviation below the mean.

Question 9

$T = \dfrac{k}{n}$ with $8 = \dfrac{k}{3}$, so $k = 24$. With 4 pumps, $T = \dfrac{24}{4} = 6$ hours.

(A)

(B) assumes the time falls by a fixed hour for each extra pump (a linear model). (C) uses direct variation, $T = \dfrac{8}{3} \times 4 \approx 10.67$ h; more pumps must take less time. (D) stops at the constant of variation, $k = 24$.

Question 10

The minimum completion time is the length of the longest path from start to finish:

PATH	LENGTH (DAYS)
A, E	3 + 6 = 9
A, C, F	3 + 4 + 3 = **10**
B, D, F	5 + 1 + 3 = 9

(C)

(A) is the earliest starting time of F, $\max(3 + 4, 5 + 1) = 7$, not the finishing time. (B) is the shortest path, but every path must be completed. (D) adds every duration, as if no two activities could run at the same time.

Question 11

$15 \text{ ML} = 15 \times 10^6 \text{ L} = 1.5 \times 10^7 \text{ L}$.

(C)

(A) is 15 000, the number of kilolitres. (B) writes 15×10^6 as 1.5×10^6 without increasing the power. (D) treats mega as 10^9.

Question 12

Quarterly rate $= 6\% \div 4 = 1.5\%$; number of quarters $= 3 \times 4 = 12$. The factor is 13.0412.

$FV = 400 \times 13.0412 = 5216.48$.

(C)

(A) uses the annual rate and the number of years, 400×3.1836. (B) treats \$1600 as an annual deposit at 6% for 3 years, 1600×3.1836, which ignores the quarterly compounding. (D) uses 6% per period for 12 periods, 400×16.8699.

Question 13

Energy $= 2.4\ \text{kW} \times 5\ \text{h} \times 30 = 360$ kWh. Cost $= 360 \times \$0.34 = \$122.40$.

(B)

(A) is the cost for one day only. (C) multiplies by 34 without changing cents to dollars. (D) uses 2400 instead of 2.4 kW.

Question 14

The graph starts at $(0, 80)$, so $k = 80$. It passes through $(1, 60)$, so $a = \dfrac{60}{80} = 0.75$. Check $(2, 45)$: $80 \times 0.75^2 = 45$. The model is $y = 80(0.75)^t$.

(D)

(A) is linear; it fits the first two points but gives 40 at $t = 2$, not 45. (B) uses the value at $t = 1$ as the starting amount. (C) is $80(0.8)^t$, giving 64 at $t = 1$: dividing by 1.25 is a 20% decrease, not 25%.

Question 15

Without replacement, exactly one licence holder can happen in two orders:

$$P = \frac{3}{10} \times \frac{7}{9} + \frac{7}{10} \times \frac{3}{9} = \frac{21}{90} + \frac{21}{90} = \frac{42}{90} = \frac{7}{15}.$$

(D)

(A) treats the choice as with replacement and counts one order: $\dfrac{3}{10} \times \dfrac{7}{10}$. (B) counts one order only: $\dfrac{21}{90}$. (C) counts both orders but with replacement: $2 \times \dfrac{21}{100}$.

Worked solutions · Section II

Question 16

The proportion tagged in the second sample estimates the proportion tagged in the whole lake:

$$\frac{18}{120} = \frac{150}{N} \quad \text{tagged in sample = tagged in lake}$$

$$N = \frac{150 \times 120}{18} = 1000$$

There are about 1000 flathead in the lake.

MARKING GUIDELINES	
CRITERIA	MARKS
Provides correct answer	2
Sets up a correct proportion, or equivalent merit	1

Inverting one of the fractions gives $N = \dfrac{150 \times 18}{120} = 22.5$, fewer fish than were tagged. Check that the estimate is larger than both samples.

Question 17

$$\text{value} = 1200 \times 3.85 = 4620$$

$$\text{brokerage} = 0.006 \times 4620 = 27.72$$

$$\text{total cost} = 4620 + 27.72 = 4647.72$$

$$\text{dividend yield} = \frac{0.21}{3.85} \times 100\% = 5.454\ldots\%$$

The total cost is $4647.72 and the dividend yield is 5.5%.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct total cost and dividend yield	2
Finds the total cost, or the dividend yield	1

The dividend yield compares the dividend per share with the price of one share; dividing the total dividend by the total cost including brokerage gives a slightly different figure and is not what was asked.

Question 18

$38 \times 31.60 = 1200.80$ ordinary hours

$4 \times 1.5 \times 31.60 = 189.60$ next 4 hours

$4 \times 2 \times 31.60 = 252.80$ the last 4 hours (46 - 42)

$3 \times 16.80 = 50.40$ meal allowance

$$1200.80 + 189.60 + 252.80 + 50.40 = 1693.60$$

Jai's gross pay is $1693.60.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct solution	4
Finds the ordinary, time-and-a-half and double time pay, or equivalent merit	3
Finds two of the three parts of the wage	2
Finds the ordinary pay, or the allowance	1

Paying all 8 extra hours at time-and-a-half gives $1630.40; read the agreement for where each rate starts.

Question 19 (a)

The edges into E are BE (7) and CE (6), so the greatest inflow is $7 + 6 =$ 13 ML per day.

MARKING GUIDELINES

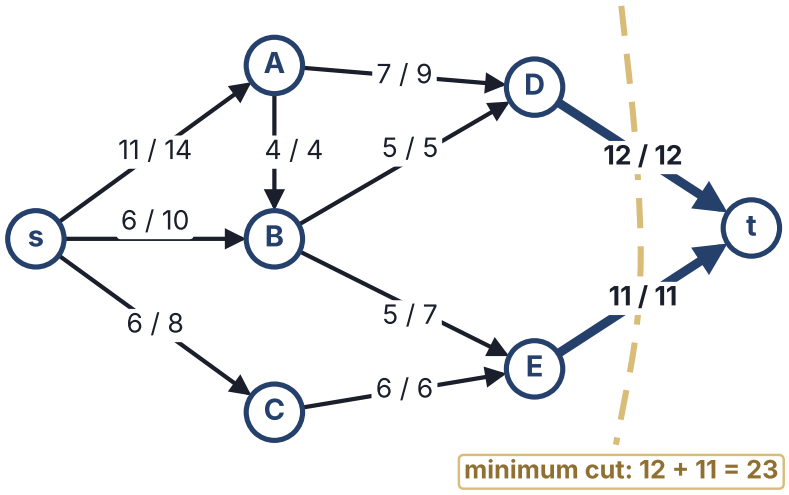
CRITERIA	MARKS
Provides correct answer	1

Question 19 (b)

One flow that the network can carry: s to A to D to t, 7; s to A to B to D to t, 4; s to B to D to t, 1; s to B to E to t, 5; s to C to E to t, 6. The total is $7 + 4 + 1 + 5 + 6 = 23$.

The cut that separates t from every other vertex crosses Dt and Et: capacity $12 + 11 = 23$. No flow can be more than the capacity of any cut, and the flow above reaches 23.

By the maximum-flow minimum-cut theorem, the maximum flow is 23 ML per day.



A maximum flow (flow / capacity on each edge) and a minimum cut of 23

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct maximum flow, justified with a cut	2
Finds a cut of capacity 23, or a flow of 23, or equivalent merit	1

Question 19 (c)

With $Et = 15$, the cut through Dt and Et rises to 27, but other cuts now limit the flow. The cut that separates $\{E, t\}$ from the rest crosses Dt, BE and CE: $12 + 7 + 6 = 25$.

A flow of 25 is possible: send 12 to D as before and $7 + 6 = 13$ into E, all of which can now reach t. So the new maximum flow is 25 ML per day.

It is less than 27 because at most 13 ML per day can reach E (part (a)): the new main from E to t cannot carry more than flows into E.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct maximum flow with a correct explanation	2
Finds the new maximum flow, or explains that the inflow to E limits the flow	1

Upgrading a saturated edge raises the flow only until another cut becomes the minimum; always look for the next smallest cut.

Question 20

Let g be the number of group lessons and p the number of private lessons.

$$g + p = 34 \quad \text{(1) number of lessons}$$

$$55g + 90p = 2290 \quad \text{(2) takings}$$

$$55g + 55p = 1870 \quad \text{(1) multiplied by 55}$$

$$35p = 420 \Rightarrow p = 12 \quad \text{(2) minus the line above}$$

$$g = 34 - 12 = 22$$

The school ran 22 group lessons and 12 private lessons (check: $55 \times 22 + 90 \times 12 = 1210 + 1080 = 2290$).

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct solution	3
Writes both correct equations and eliminates a variable, or equivalent merit	2
Writes one correct equation	1

Question 21

The angle of depression equals the angle of elevation of the cliff top from the kayak (alternate angles), so in the right-angled triangle the side opposite $17^\circ 24'$ is 46 m and the distance d is the adjacent side.

$$\tan 17^\circ 24' = \frac{46}{d}$$

$$d = \frac{46}{\tan 17^\circ 24'} = 146.78\ldots$$

The kayak is 147 m from the base of the cliff.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer	2
Writes a correct trigonometric equation	1

-

Using $\tan 17^\circ 24' = \dfrac{d}{46}$ puts the angle at the cliff top and gives about 14 m: mark the angle of depression at the kayak first.

Question 22

On 10 November 2026 NSW is on daylight saving time, so Eden is UTC$+11$.

$$7{:}30\text{ am Tue} - 11\text{ h} = 8{:}30\text{ pm Mon (UTC)}$$

$$8{:}30\text{ pm Mon} - 10\text{ h} = 10{:}30\text{ am Mon} \quad \text{Honolulu is UTC}-10$$

The time difference is 21 hours, and the call starts at 10:30 am on Monday 9 November in Honolulu.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct day and time	3
Finds the 21 hour time difference, or equivalent merit	2
Uses UTC$+11$ for Eden, or finds the UTC time	1

Ignoring daylight saving gives a 20 hour difference and 11:30 am Monday.

Question 23 (a)

Enter the pairs in the calculator's statistics mode (linear regression): $r = 0.972\,59\ldots$, so $r = 0.9726$.

There is a strong positive linear association: hotter days go with more ice blocks sold.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct value and description	2
Provides correct value, or a correct description	1

Question 23 (b)

The calculator gives gradient $3.9944\ldots$ and intercept $-38.9701\ldots$, so the line is $y = 3.99x - 38.97$.

Interpretation: on average, about 4 more ice blocks are sold for each 1 °C rise in the maximum temperature.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct equation and interpretation	2
Provides correct equation, or a correct interpretation of the gradient	1

Question 23 (c)

$y = 3.99 \times 42 - 38.97 = 128.61$, so the prediction is about 129 ice blocks.

The prediction is not reliable: 42 °C is outside the range of the data (21 °C to 35 °C), so it is an extrapolation. On a very hot day fewer people may go to the beach, or the kiosk may sell out, so the linear pattern may not continue.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct prediction and a valid comment on reliability	2
Provides correct prediction, or a valid comment	1

A strong r does not rescue an extrapolation: name the range of the data and say that 42 °C is outside it.

Question 24 (a)

$$S = V_0(1-r)^n = 86\,000(1-0.18)^5$$

$$= 86\,000 \times 0.82^5 = 31\,883.626\ldots$$

The boat is worth $31 883.63 after 5 years.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer	2
Substitutes correctly into the declining balance formula	1

Question 24 (b)

YEARS	STRAIGHT-LINE VALUE ($)	DECLINING BALANCE VALUE ($)
4	$86\,000 - 4 \times 11\,200 = 41\,200$	$86\,000 \times 0.82^4 = 38\,882.47$
5	$86\,000 - 5 \times 11\,200 = 30\,000$	$86\,000 \times 0.82^5 = 31\,883.63$

After 4 years the straight-line value is still higher (41 200 > 38 882.47). After 5 years it is lower (30 000 < 31 883.63).

The straight-line value is first lower after 5 years.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer with values for both methods after 4 and 5 years	2
Compares the two values for one year correctly, or equivalent merit	1

The straight-line value falls by the same amount each year; the declining balance falls by less each year. Show the year before the change as well, or the word 'first' is not justified.

Question 25

$$\text{Clark: } \frac{22 \times 500}{70} = 157.14\ldots \approx 157 \text{ mg}$$

$$\text{Young: } \frac{6 \times 500}{6+12} = 166.66\ldots \approx 167 \text{ mg}$$

$$166.67 - 157.14 = 9.52\ldots$$

Clark's formula gives 157 mg, Young's formula gives 167 mg, and the difference is 10 mg.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct solution	3
Finds both dosages, or equivalent merit	2
Finds one dosage	1

Question 26 (a)

$r = 4.8\% \div 12 = 0.4\%$ per month and $n = 4 \times 12 = 48$; the factor is 52.8016.

$FV = 350 \times 52.8016 = 18\,480.56$, so the future value is $18 480.56.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer	2
Selects the correct interest factor	1

Question 26 (b)

For 5 years, $n = 60$ at 0.4%: the factor is 67.6602.

$$\text{deposit} \times 67.6602 = 25\,000$$

$$\text{deposit} = \frac{25\,000}{67.6602} = 369.493\ldots$$

Ella needs to deposit $369.49 per month.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer	2
Selects the factor 67.6602, or equivalent merit	1

Dividing $25 000 by 60 months ignores interest and gives $416.67, a deposit that is too large.

Question 27 (a)

	WENT WHALE WATCHING	DID NOT GO WHALE WATCHING	TOTAL
Swam at the beach	30	**50**	80
Did not swim	**20**	**50**	**70**
Total	50	**100**	150

Swam only: $80 - 30 = 50$. Whale watching only: $50 - 30 = 20$. Neither: $150 - 30 - 50 - 20 = 50$.

MARKING GUIDELINES

CRITERIA	MARKS
Completes the table correctly	2
Finds at least two of the missing values	1

Question 27 (b)

Exactly one activity: $50 + 20 = 70$ of 150 visitors, so $P = \dfrac{70}{150}$.

Expected number $= np = 3000 \times \dfrac{70}{150} = 1400$.

About 1400 people will have done exactly one of the activities.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer	2
Finds the probability $\dfrac{70}{150}$, or equivalent merit	1

'Exactly one' leaves out the 30 who did both: $\dfrac{100}{150}$ is the probability of at least one.

Question 28

$$\text{daily rate} = \frac{0.219}{365} = 0.0006$$

$1260(1 + 0.0006)^{20} = 1275.206\ldots$ compound daily for 20 days

$$\text{interest} = 1275.21 - 1260 = 15.21$$

The interest charged is $15.21.

MARKING GUIDELINES

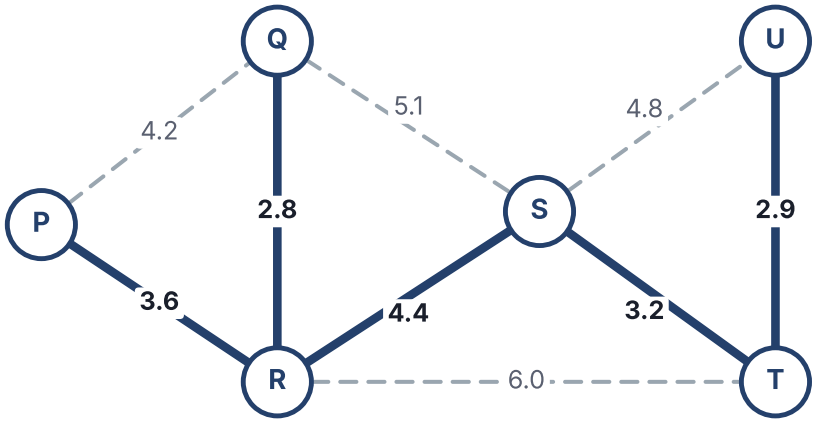
CRITERIA	MARKS
Provides correct answer	2
Uses the daily rate in a compound interest calculation, or equivalent merit	1

Simple interest for 20 days, $1260 \times 0.0006 \times 20 = 15.12$, is close but is not the method credit cards use: interest compounds daily.

Question 29

Kruskal's algorithm: take the edges in order of length, rejecting any edge that makes a cycle.

EDGE	LENGTH (KM)	DECISION
QR	2.8	accept
TU	2.9	accept
ST	3.2	accept
PR	3.6	accept
PQ	4.2	reject (cycle P, Q, R)
RS	4.4	accept (5 edges: done)



The minimum spanning tree (thick edges)

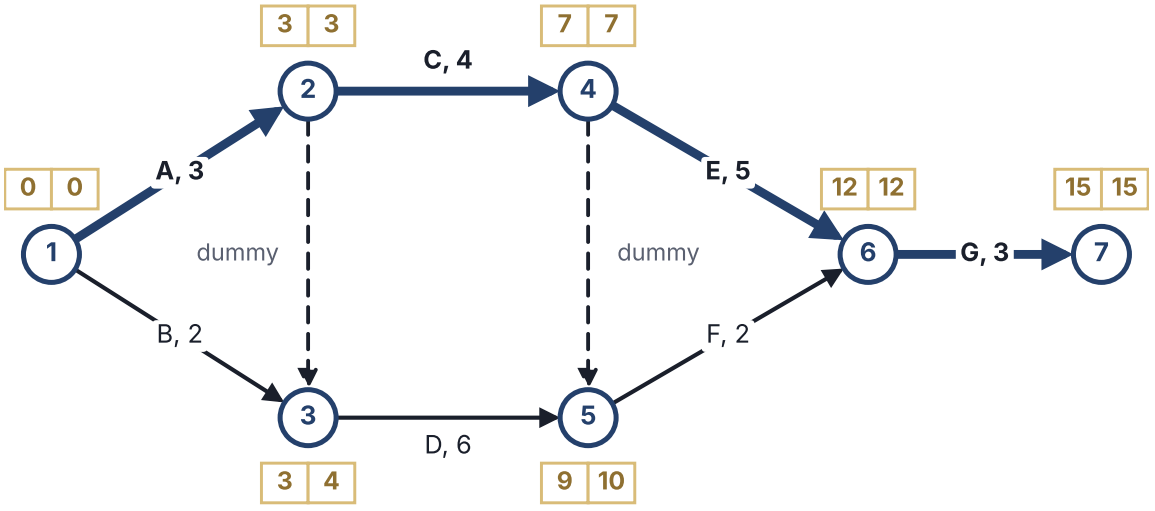
Total length $= 2.8 + 2.9 + 3.2 + 3.6 + 4.4 = 16.9$, so 16.9 km of track is upgraded.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct tree and total length	3
Provides a correct tree, or a spanning tree with one error and its correct total	2
Selects at least three correct edges	1

Question 30 (a)

C needs only A, but D needs both A and B, so a dummy runs from the end of A to the end of B. Likewise E needs only C, but F needs C and D, so a second dummy runs from the end of C to the end of D.



The project network with the earliest and latest times at each vertex (critical path thick, dummies dashed)

MARKING GUIDELINES

CRITERIA	MARKS
Draws a correct network with both dummies	2
Draws a network with one error or omission, such as a missing dummy	1

Every vertex where a dummy arrives must have all the predecessors of the activity that leaves it, and no more. Check each row of the table against the diagram.

Question 30 (b)

VERTEX	EARLIEST TIME (FORWARD SCAN)	LATEST TIME (BACKWARD SCAN)
1	0	$\min(3-3, 4-2) = 0$
2	3	$\min(7-4, 4-0) = 3$
3	$\max(2, 3+0) = 3$	$10-6 = 4$
4	$3+4 = 7$	$\min(12-5, 10-0) = 7$
5	$\max(3+6, 7+0) = 9$	$12-2 = 10$
6	$\max(7+5, 9+2) = 12$	12
7	$12+3 = 15$	15

The activities with zero float are A, C, E and G. The critical path is A, C, E, G and the minimum completion time is 15 days $(3+4+5+3)$.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct critical path and minimum completion time	2
Provides correct critical path, or the correct minimum completion time	1

Question 30 (c)

Float of D = LST − EST $= (10-6) - 3 = 1$ day. A 2 day delay uses the 1 day of float and pushes the finish back 1 day. (Check: D now ends at day 11, F at 13, so G starts at 13.)

The new minimum completion time is 16 days.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer	1

Adding the full 2 days (17 days) ignores the float; a delay to a non-critical activity costs only the part of it that is more than the float.

Question 31

$$A = \frac{1}{2}ab\sin C = \frac{1}{2} \times 38 \times 52 \times \sin 116^\circ$$

$$= 888.008\ldots$$

The area is 888 m^2.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer	2
Substitutes correctly into the area formula	1

A calculator in radian mode gives about 234 m^2 here, which is wrong; check that the calculator is in degrees.

Question 32 (a)

Convert the times to seconds: swim mean 440 s, Sam 390 s; run mean 550 s, Sam 510 s.

$$z_{swim} = \frac{390 - 440}{25} = -2$$

$$z_{run} = \frac{510 - 550}{40} = -1$$

A lower time is better. Sam's swim is 2 standard deviations below (faster than) the mean, and the run only 1, so Sam performed better in the swim.

MARKING GUIDELINES

CRITERIA	MARKS
Provides both z-scores and a correct conclusion	2
Finds one z-score correctly, or equivalent merit	1

With times, a negative z-score is good. Choosing the run because -1 is larger than -2 forgets what the scores measure.

Question 32 (b)

Sam's swim has $z = -2$. About 95% of times lie between $z = -2$ and $z = 2$, so $\frac{100\% - 95\%}{2} = 2.5\%$ lie below $z = -2$.

$0.025 \times 400 = 10$, so about 10 candidates swam faster than Sam.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer	2
Finds 2.5%, or equivalent merit	1

Question 33

$$\text{sale price} = 0.85 \times 935 = 794.75$$

$$\text{GST} = \frac{794.75}{11} = 72.25 \quad \text{GST is } \tfrac{1}{11} \text{ of a GST-inclusive price}$$

The GST included in the sale price is \$72.25.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer	2
Finds the sale price, or the GST in the original price (\$85), or equivalent merit	1

10% of the sale price, \$79.48, is the common error: the 10% is charged on the price before GST.

Question 34

The monthly rate is $7.2\% \div 12 = 0.6\%$. Each month: interest $= 0.006\times$ opening balance, closing balance $=$ opening $+$ interest $-$ 750, and the next opening balance is this closing balance.

MONTH	OPENING BALANCE ($)	INTEREST ($)	REPAYMENT ($)	CLOSING BALANCE ($)
1	24 000.00	144.00	750.00	23 394.00
2	23 394.00	140.36	750.00	22 784.36
3	22 784.36	136.71	750.00	22 171.07
4	22 171.07	133.03	750.00	21 554.10

After four repayments Kai owes \$21 554.10, so he has reduced the original amount by $24\,000 - 21\,554.10 =$ \$2445.90 (the \$3000 repaid less \$554.10 of interest).

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct solution	3
Completes the table correctly, or equivalent merit	2
Finds the interest for month 2 or month 3 correctly	1

Interest is charged on the balance owing at the start of each month, which falls each month; using \$144 every month is the common error.

Question 35

Scale 1 : 2000, so 1 cm on the plan is 2000 cm = 20 m. Actual lengths: $AB = 100$ m, so $h = 50$ m, and the widths are $3.2 \times 20 = 64$ m, $4.1 \times 20 = 82$ m and $3.6 \times 20 = 72$ m.

$$A \approx \frac{50}{2}(64 + 82) + \frac{50}{2}(82 + 72) \quad \text{two applications}$$

$$= 3650 + 3850 = 7500 \text{ m}^2$$

$$V = Ah = 7500 \times 0.012 = 90 \text{ m}^3 \quad 12 \text{ mm} = 0.012 \text{ m}$$

$$90 \text{ m}^3 = 90\,000 \text{ L} = 90 \text{ kL} \quad 1 \text{ m}^3 = 1000 \text{ L}$$

The paddock has an area of 7500 m², and 90 kL of rain falls on it.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct solution	4
Finds the area and the volume in m³, or equivalent merit	3
Finds the actual area, 7500 m²	2
Converts the plan measurements using the scale, or applies the Trapezoidal rule once	1

Applying the Trapezoidal rule to the plan measurements and then multiplying by 2000 once gives an area 2000 times too small: an area scales by the square of the scale factor. Convert lengths first.

Question 36

There are 40 days, so the median is the average of the 20th and 21st values. The cumulative frequencies are 6, 17, 26, ...: the 18th to the 26th values are 2, so the median is 2.

$$\bar{x} = \frac{0 \times 6 + 1 \times 11 + 2 \times 9 + 3 \times 7 + 4 \times 4 + 5 \times 3}{40} = \frac{81}{40} = 2.025$$

The mean is 2.025 rescues per day.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct median and mean	2
Provides correct median, or correct mean	1

The median is a number of rescues, not a frequency: answering 9 (the frequency in the middle of the table) is the common error.

Question 37 (a)

$C = 1800 + 14x, \qquad I = 38x$

$38x = 1800 + 14x \Rightarrow 24x = 1800 \Rightarrow x = 75$ break-even: $I = C$

$I = C = 38 \times 75 = 2850$

The break-even point is 75 T-shirts, where the cost and the income are both \$2850.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct equations and break-even point	2
Provides correct equations, or equivalent merit	1

Question 37 (b)

$x = 60: \ I - C = 2280 - (1800 + 840) = -360$ a loss

$24x - 1800 = 1200 \Rightarrow 24x = 3000 \Rightarrow x = 125$ profit $= I - C$

Selling 60 T-shirts gives a loss of \$360, and 125 T-shirts must be sold for a profit of \$1200.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct loss and number of T-shirts	2
Provides one correct answer	1

Question 38

$r = 0.9 \text{ m}$ half the diameter

$$\text{curved surface} = 2\pi rh = 2\pi \times 0.9 \times 2.2 = 12.440\ldots$$

$$\text{top} = \pi r^2 = \pi \times 0.9^2 = 2.544\ldots$$

$$\text{area} = 14.985\ldots \text{ m}^2$$

$$\text{paint} = \frac{14.985\ldots}{8} = 1.87\ldots \text{ L}$$

More than 1 litre is needed, so 2 tins must be bought.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct solution	3
Finds the area to be painted, or equivalent merit	2
Finds the curved surface area or the area of the top	1

Using the diameter as the radius, or painting the base as well, are the errors to avoid; and 1.87 tins means 2 tins, not 1.

Question 39 (a)

From the graph the x-intercepts are 0 and 24. The axis of symmetry is midway between them: $x = 12$.

$y = -0.05 \times 12^2 + 1.2 \times 12 = -7.2 + 14.4 = 7.2$, so the greatest height is 7.2 m.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct axis of symmetry and greatest height	2
Provides correct axis of symmetry	1

Question 39 (b)

At $x = 22$: $y = -0.05 \times 22^2 + 1.2 \times 22 = -24.2 + 26.4 = 2.2$ m. This is less than 3 m, so the ball does not clear the fence.

Without the fence, the model is valid from the kick to where the ball lands: $0 \le x \le 24$. Outside these values the model gives a negative height, which has no meaning.

MARKING GUIDELINES

CRITERIA	MARKS
Provides a correct justified conclusion and the correct values of x	2
Provides a correct justified conclusion, or the correct values of x	1

Question 40 (a)

$$HQ^2 = 14^2 + 9^2 - 2 \times 14 \times 9 \times \cos 87^\circ \quad \text{cosine rule}$$

$$= 277 - 252 \cos 87^\circ = 263.81\ldots$$

$$HQ = 16.24\ldots$$

The distance HQ is 16.2 km.

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct answer	2
Substitutes correctly into the cosine rule	1

Question 40 (b)

Find the angle HQP with the sine rule (it is acute, since it is opposite the 14 km side, which is shorter than HQ):

$$\frac{\sin \angle HQP}{14} = \frac{\sin 87^\circ}{16.24\ldots}$$

$$\sin \angle HQP = 0.8608\ldots \Rightarrow \angle HQP = 59.40\ldots^\circ$$

The bearing of P from Q is the reverse of 155°: $155^\circ + 180^\circ = 335^\circ$. The harbour is 59.4° anticlockwise from QP (to the west of it), so its bearing from Q is $335^\circ - 59.4^\circ = 275.6^\circ$.

The bearing of the harbour from Q is 276° (to the nearest degree).

MARKING GUIDELINES

CRITERIA	MARKS
Provides correct solution	3
Finds angle HQP and the bearing of P from Q, or equivalent merit	2
Finds angle HQP, or the bearing of P from Q	1

Giving 59° (the angle in the triangle) as the bearing is the common error. A bearing is measured clockwise from north at Q: draw the north line at Q and mark 335° first.

What this paper examined

Marks for each Year 12 focus area and for the Year 11 course, against the target for an MA99 Standard 2 practice paper (Year 11 about a fifth to a quarter of the marks, as in NESA's sample paper, and the rest spread across all ten Year 12 focus areas).

FOCUS AREA	SECTION I	SECTION II	MARKS	TARGET
Algebraic relationships	9, 14	20 (3), 37 (4), 39 (4)	13	13
Investment and loans	6	17 (2), 24 (4), 28 (2), 34 (3)	12	12
Annuities	12	26 (4)	5	5
Trigonometry	5	21 (2), 31 (2), 40 (5)	10	10
Ratios and rates	3, 13	16 (2), 35 (4)	8	9
Network flow	1	19 (5)	6	5
Critical path analysis	10	30 (5)	6	6
Bivariate data analysis	7	23 (6)	7	7
Relative frequency and probability	2, 15	27 (4)	6	6
The normal distribution	8	32 (4)	5	5
Year 11 course	4, 11	18 (4), 22 (3), 25 (3), 29 (3), 33 (2), 36 (2), 38 (3)	22	22
Total	15	85	**100**	100

The Year 11 marks examine Earning money (Question 18), Time and location (22), Formulas and equations (25), Networks, paths and trees (29), Managing money (33), Data analysis (36), Applications of measurement (11 and 38) and Linear relationships (4). Several questions join two areas: Question 35 uses scale and the Trapezoidal rule, Question 32 converts times before finding z-scores, and Question 37 links break-even to profit and loss. Marks are counted under the focus area each part mainly examines.

End of worked solutions.

About this resource

MA99 EDUCATION

Scope

NSW Mathematics Standard 2, Year 12. Written to the NSW Mathematics Standard 11-12 Syllabus (2024), an HSC style paper on the whole course: the Year 12 focus areas, with the Year 11 course as assumed knowledge, for students sitting the HSC in 2027 and later years. Every value and solution was re-derived independently by computer algebra before printing. Contexts in the questions are invented unless a source is named.

Permitted use

Print it, annotate it and keep it on any device you own, for your own study.

Not permitted

Sharing, posting, selling or redistributing it, in whole or in part. Each copy is licensed to one student.

Copyright MA99 Education.
ma99education.com.au