

**HIGHER COLLEGES OF TECHNOLOGY
KEY COMMON ASSESSMENT**

**FOUNDATION MATHEMATICS
MATH 070**

Version B

Marking Scheme

CHALLENGE 2002

1 345 students want to go to Ras Al Khaimah for a football match. A bus holds 42 students. How many buses are needed? [3 marks]

$$\begin{array}{r} 345 \div 42 \\ = 8.214... \end{array}$$

9 buses are needed

M1: division by 42

A1: answer

M1: rounding up

2 Use your calculator to find the answer to the following. Leave your answer in fractional or mixed number form. [1 mark]

$$\frac{\frac{2}{3}}{\frac{5}{7} - \frac{1}{4}} =$$

$$1\frac{17}{39} \quad \text{or} \quad \frac{56}{39}$$

A1

3 A building contractor bought $4\frac{1}{5}$ hectares of land for Dh 315 000.

a) What was the cost of each hectare? [2 marks]

$$\begin{array}{l} 315000 \div 4\frac{1}{5} \\ = \text{Dh } 75\,000 \end{array}$$

M1: division by 4 1/5

A1: answer

Do not penalize for omitting units

b) How many hectares can he buy for Dh 600 000? [2 marks]

$$\begin{array}{l} 600\,000 \div 75\,000 \\ = 8 \text{ hectares} \end{array}$$

M1: dividing by 75000

A1: answer

Do not penalize for omitting units

Allow setting up proportion from original information

Allow follow-through from a)

4 The base of a pole is 2.5 metres below ground level. The top of the pole is 12.4 metres above ground level. What is the total length of the pole? [2 marks]

$$12.4 + 2.5$$

M1: adding up the two amounts

$$= 14.9 \text{ m}$$

A1: answer does not have to include unit

5 A Sprite bottle holds 350 mL. How many bottles can be filled from 10 L of Sprite? [3 marks]

$$10 \text{ L} = 10\,000 \text{ mL}$$

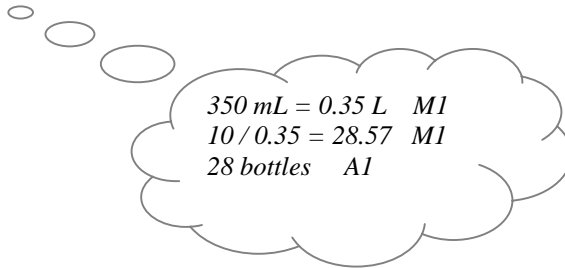
M1: converting to mL or to L

$$10000 \div 350 = 28.57$$

M1: dividing

Only 28 bottles can be filled

A1: correct answer of 28



6 Ahmad runs at a speed of 12 km/h. Write this in m/s. Show your work. [3 marks]

$$12 \times 1000 = 12\,000 \text{ m}$$

M1: changing km to m

$$1 \text{ h} = 3600 \text{ s}$$

M1: changing h to s

$$12 \text{ km/h} = 12000 \text{ m} / 3600 \text{ s} =$$

A1: answer in bar, mixed number or correctly rounded to one or more decimal places

$$3.\bar{3} \text{ or } 3\frac{1}{3} \text{ m/s}$$

omission of m/s not penalised

7 Maryam is traveling to Oman next week. She needs 2400 Omani riyals to cover her expenses. How much will that cost her in dirhams? [3 marks]

	Buy	Sell
Omani riyals	9.3990	9.6558

Bank is selling, rate is **9.6558**
 It will cost her: 2400×9.6558
 = Dh 23 173.92

M1: identifying the correct rate
M1: multiplying by 2400
A1: answer to 2 d.p., must have units

$2400 \times 9.3990 = 22\,557.60$
 2 marks, must have zero

8 Write the following ratio in its simplest form: [2 marks]

2 years : 72 weeks

$2 \times 52 : 72$
 = $104 : 72$
 = $13 : 9$

M1: convert to weeks
A1: correctly simplifying, allow follow through

$2:72=1:36$
 1 mark

9 A profit of Dh 588 000 is divided amongst three business partners: Hassan, Ali and Latif in the ratio of their investments in the company. Hassan's investment is Dh 10.8 million, Ali's Dh 8.4 million and Latif's Dh 14.4 million.

a) Write the ratio of Hassan's to Ali's to Latif's investments in the company in its simplest form. [2 marks]

10.8 : 8.4 : 14.4
 = **9 : 7 : 12**

M1: setup ratio
(with or without Dh & million)
A1: answer in simplest form

b) Find Latif's share of the profit. [3 marks]

$9 + 7 + 12 = 28$
 $\frac{12}{28} \times 588\,000$
 = Dh 252 000

M1: adding up total shares
M1: multiplying by 12/28 to get Latif's share
A1: answer
(do not penalize for omitting unit)

10 Simplify the following fraction:

[2 marks]

$$\frac{a^2b}{ab^2 - ab}$$

$$\frac{a^2b}{ab^2 - ab} = \frac{a^2b}{ab(b-1)}$$

$$= \frac{a}{b-1}$$

M1: for factorizing the denominator

*A1: correct answer
full marks without method*

11 Make R the subject of the formula:

[3 marks]

$$A = \frac{iR}{R+r}$$

$$AR + Ar = iR$$

$$AR - iR = -Ar$$

$$R(A - i) = -Ar$$

$$R = \frac{-Ar}{A - i}$$

M1: cross multiply

M1: collect like terms & factorize

A1: also accept $R = \frac{Ar}{i - A}$

12 Ya Lahwi College paid Dh 12 400 for electricity and water. Electricity was Dh 380 less than three times the cost of water. How much was the cost of electricity?

[4 marks]

$$E + W = 12\ 400$$

$$E = 3W - 380$$

$$3W - 380 + W = 12\ 400$$

M1: setup first equation

M1: setup second equation

M1: substitution

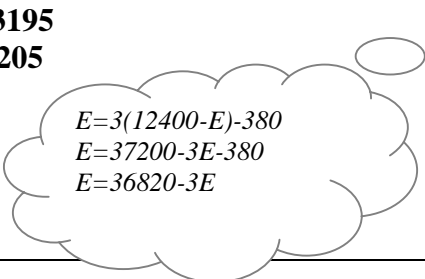
(Award M3 if first two equations are missing)

○ Allow for equation in E

$$W = 3195$$

$$E = 9205$$

A1: answer, unit need not be shown



$$E = 3(12400 - E) - 380$$

$$E = 37200 - 3E - 380$$

$$E = 36820 - 3E$$

- 13 A simple pendulum takes t seconds to complete one swing. It is given by the formula:

$$t = \sqrt{\frac{L}{g}} \times 2\pi$$

Find the time t , correct to 3 decimal places, given $L = 13.0$ and $g = 9.8$
(Use the π - button on your calculator)

[3 marks]

$$t = 2\pi \sqrt{\frac{13}{9.8}}$$

$$= 7.236665632$$

$$= 7.237 \text{ s}$$

M1: substitution

A1: answer

A1: answer correctly rounded to 3 d.p. with unit

*Use of 3.14 with answer 7.233
Deduct 1 mark*

- 14 Solve the following equations:

a) $3 - \frac{1}{3}(2y - 1) = \frac{3}{4}$

Alternative:

(x12): $36 - 4(2y - 1) = 9$ M1

$36 - 8y + 4 = 9$

$40 - 8y = 9$

$-8y = 9 - 40 = -31$ M1

$y = 31/8$ A1

[3 marks]

$$3 - \frac{2y}{3} + \frac{1}{3} = \frac{3}{4}$$

M1: expanding brackets

Allow follow through from ss' answer here

$$3\frac{1}{3} - \frac{2}{3}y = \frac{3}{4}$$

$$-\frac{2}{3}y = \frac{3}{4} - 3\frac{1}{3} = -2\frac{7}{12}$$

M1: collecting like terms

$$y = \frac{31}{8}$$

A1: answer, also accept 3.875 & $3\frac{7}{8}$

b) $0.2 - 0.3x - 0.9 = 0.2x - 0.7 + 0.3x$

[2 marks]

$$-0.3x - 0.2x - 0.3x = -0.2 + 0.9 - 0.7$$

M1: collect like terms

Allow follow through from ss' answer here

$$-0.8x = 0$$

$$x = 0$$

A1: answer

15 Khalil drove from Ras Al Khaimah to Al Ain. He left Ras Al Khaimah at 09:55 and drove for 3 hours and 20 minutes. When did he arrive in Al Ain? Give your answer using the 24-hour clock. [3 marks]

$$\begin{array}{r} 09:55 \\ + 3:20 \\ \hline 12:75 \\ 13:15 \end{array}$$

M1: for adding

M1: for 12:75

He arrived in Al Ain at 13:15 *A1: answer, no credit for 1:15 pm*

16 Camilla begins work each day at 08:30 and finishes at 17:50. She gets two 20-minute coffee breaks and a one-hour lunch break. How long does Camilla work each day? Write your answer in hours and minutes. [3 marks]

$$\begin{aligned} 17:50 - 8:30 &= 9:20 \\ 0:20 + 0:20 + 1 &= 1:40 \\ 9:20 - 1:40 &= 8:80 - 1:40 = 7:40 * \end{aligned}$$

She works for 7 h and 40 min

M1: subtract to get duration

M1: subtract breaks from duration & to convert 9:20 to 8:80

A1: to express the answer in hours and minutes

*Allow follow through from **

Allow for alternative methods

Not all steps have to be shown

17 Steve's weekly pay was increased from Dh 2300 to Dh 2500. What is the increase in his **annual** pay? [3 marks]

$$\begin{aligned} \text{Weekly increase} &= 2500 - 2300 = 200 \\ \text{Annual increase} &= 200 \times 52 \\ &= \text{Dh } 10\,400 \end{aligned}$$

M1: subtract to get amount

M1: multiply by 52

A1: omission of units not penalized
Allow for alternative methods

- 18 The number of hours an employee worked in four weeks is given in the table below. He is paid an hourly rate of AED 95. For any hours exceeding 42 in a week, he gets paid overtime at twice the normal rate.

Week 1	Week 2	Week 3	Week 4
46	44.5	42.5	48

- a) What is his overtime pay for one hour?

[1 mark]

$$95 \times 2 = 190$$

AI: no unit is necessary

- b) What is his overtime pay for the four weeks?

[3 marks]

$$OT = 4 + 2.5 + 0.5 + 6 = 13 \text{ hours}$$

M1: to add OT hours

$$OT \text{ pay} = 13 \times 190$$

M1: multiply hours by 190

$$= \text{Dh } 2470$$

AI: answer

Allow follow through from (a)

No penalty for missing unit

- c) What is his total pay for the four weeks?

[3 marks]

$$\text{Regular pay} = 42 \times 4 \times 95 = \text{Dh } 15\,960$$

M1: multiply by 4 and 95

$$\text{Total pay} = 15\,960 + 2470$$

M1: add the two numbers

Allow follow through from (b)

$$= \text{Dh } 18\,430$$

AI: answer, absence of unit not penalized

- 19 There were 50 questions on an exam. Humaid answered 36 questions correctly. What percentage of the exam did he **not** answer correctly?

[3 marks]

$$50 - 36 = 14$$

M1: subtract

$$\frac{14}{50} \times 100\%$$

M1: setting up % calculation

$$= 28\%$$

AI: answer

Allow for 100% - 72% method

20 The price of a typewriter was reduced by 40%. The original price was Dh 870. By how much was the price reduced? [2 marks]

**The reduction is 870×0.4
= Dh 348**

M1: for multiplying
A1: answer
Omission of unit is not penalized

21 Samya calculated the answer to $\frac{87.3}{(9 \times 0.02)}$.

She read the answer incorrectly as 435.
Find the percentage error to the nearest tenth percent. [4 marks]

$\frac{87.3}{(9 \times 0.02)} = 485$
error = $485 - 435 = 50$
% error = $\frac{50}{485} \times 100\%$
= 10.3%

M1: evaluate

M1: find amount of error
M1: setting up % calculation

A1: answer to 1 d.p

22 The actual sales for last month were Dh 40 500. This was 90% of the expected sales.

a) What were the expected sales? [2 marks]

$40\ 500 = 0.9 \times \text{Sales}$
 $\text{Sales} = 40\ 500 \div 0.9 = \text{Dh } 45000$

M1: set up equation
A1: answer
Omission of unit not penalized

b) How much was the decrease? [2 marks]

$45\ 000 - 40\ 500$
= Dh 4500

M1: subtract
A1: answer
Allow follow through from (a)

23 The number of workers employed by 20 small companies in Dubai are listed below:

19 16 15 17 15
 17 15 17 15 16
 15 19 15 16 15
 18 15 17 16 17

a) Fill in the frequency distribution table below:

[3 marks]

WORKERS EMPLOYED	TALLY	FREQUENCY
15	IIII III	8
16	IIII	4
17	IIII	5
18	I	1
19	II	2
TOTAL		20

M1: for first column
 M2: for last column,
 minus 1 for each pair of mistakes
 Award full credit if correct
 frequencies are arrived at
 without tallying

b) How many companies employed at most 17 workers?

[1 mark]

$8+4+5=17$

A1 answer

c) What percentage of companies employed more than 16 workers?

[3 marks]

$5+1+2=8$ *
 $8 \div 20 = 0.4$
 = 40%

M1: adding up 5, 1 and 2
 M1: dividing by 20, allow follow
 through from ss' answer at *
 A1: converting to percentage

d) Find the mean for the above set of data.

[3 marks]

$15 \times 8 + 16 \times 4 + 17 \times 5 + 18 \times 1 + 19 \times 2$
 = 325

M1: multiplying each x by f and
 adding up (Ss may use the
 original 30 values)

$325 \div 20$
 = 16.25

M1: division by 20
 A1: answer, accept correctly rounded
 answers

e) Find the mode.

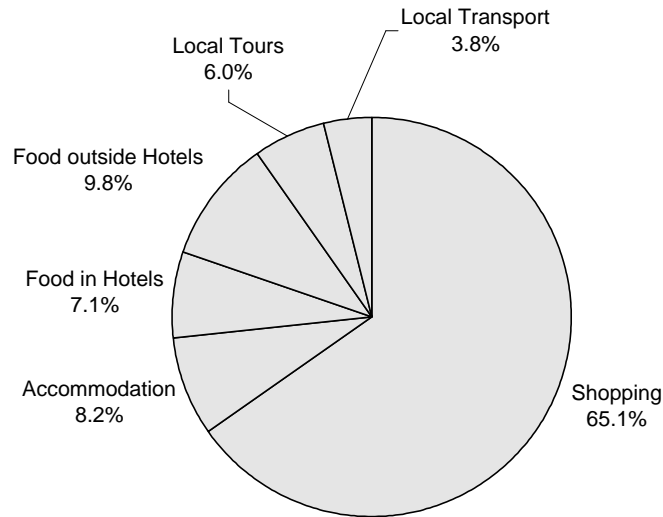
[1 mark]

Mode = 15

A1

15+16+17+
 18+19=85
 85/20=4.25
 1 mark

**Spending by Foreign Visitors at the 1997 Dubai Shopping Festival
(in millions of dirhams)**



24 Answer the following questions related to the pie chart shown above.

a) On what did the visitors spend the least?

[1 mark]

Local Transport

A1

b) Altogether what percentage was spent on Shopping and Food in Hotels?

[2 marks]

$$65.1\% + 7.1\% \\ = 72.2\%$$

M1: adding

*A1: answer must include % sign **

c) What percentage of the total spending was **not** on shopping?

[2 marks]

$$100\% - 65.1\% \\ = 34.9\%$$

M1: subtract from 100%

*A1: answer must include % sign **

** if both omitted, penalize once only*

d) The total sum of money spent during the festival was Dh 1 839 000 000. How much of this money was spent on accommodation?

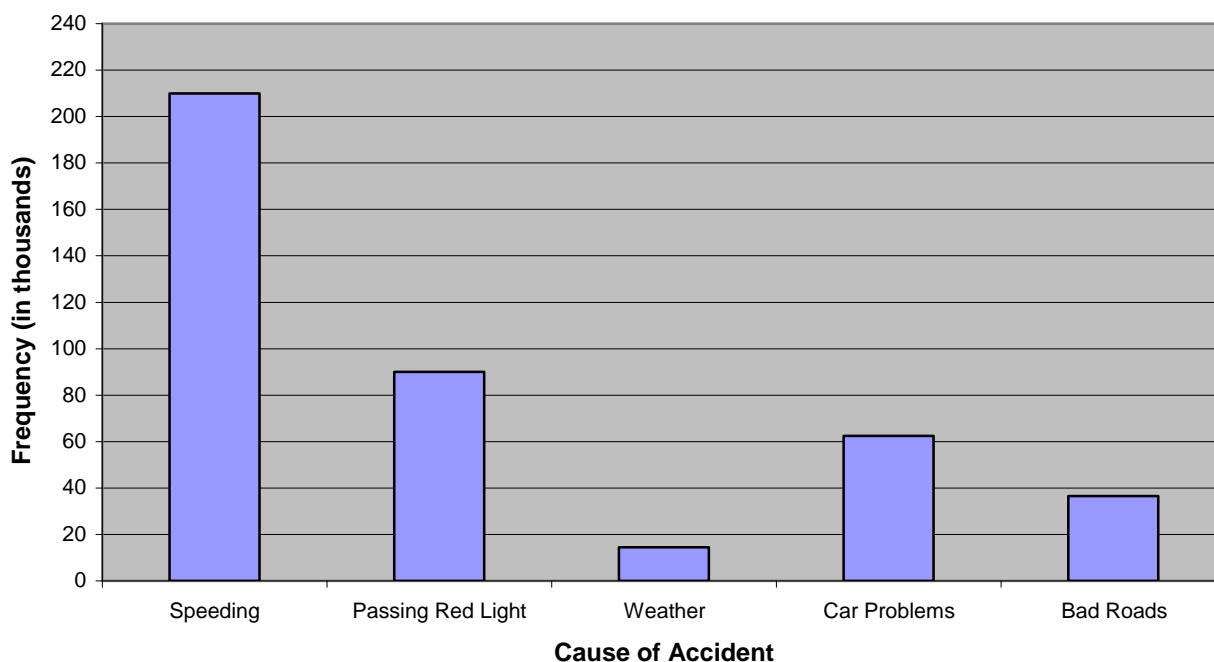
[2 marks]

$$1839000000 \times 0.082 \\ = \text{Dh } 150\,798\,000$$

M1: multiplying by rate (8.2/100)

A1: answer, omission of unit not penalized

**Causes of Car Accidents in Ras Al Khaimah
In The Year 2001**



25 Look at the bar chart and answer the following questions:

a) What are the y-axis intervals?

[1 mark]

20 thousands = 20 000

AI: no credit for the answer of 20

b) What caused the greatest number of accidents in Ras Al Khaimah in 2001?

[1 mark]

Speeding

AI

c) How many accidents were caused by passing a red light?

[1 mark]

90 000

AI: (see note in part d)

d) What was the difference in the number of accidents caused by speeding and those caused by weather?

[2 marks]

**210 000 – 15 000
= 195 000**

AI: for reading the two values

AI: for answer

accept answers in the range 193000 to 197000

Penalize once only if thousands is not stated or expressed in parts c) d) & e)

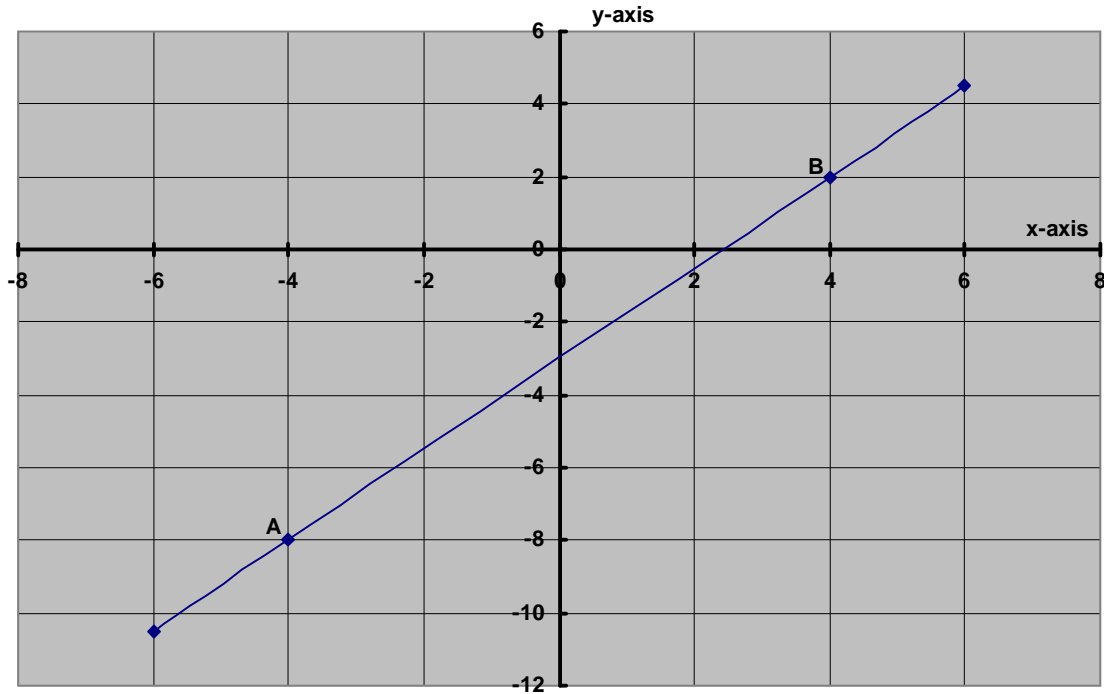
e) What was the total number of car accidents in Ras Al Khaimah in 2001?

[2 marks]

**210+90+15+62.5+37.5 = 415
415 000**

MI: for adding up the five values

AI: accept answers in range of 408 5000 to 421 500



26 The graph of a linear equation is shown above.
A and B are two points on the line.

a) What is the y-intercept?

-3

A1

[1 mark]

b) Find the slope of the line.

Using the two points (-4, -8) and (4, 2)

$$\text{Slope} = \frac{2 - (-8)}{4 - (-4)} = \frac{10}{8}$$

$$= \frac{5}{4}$$

M1: for numerator (or rise)

M1: for denominator (or run)

*A1: simplified correct answer
(accept 1.25)*

[3 marks]

c) Write down the equation of the line.

$$y = mx + b$$

$$y = (5/4)x - 3$$

M1: for correct equation

A1: for correct substitution into the equation

Allow follow through with their answers from (a) and (b)

Also accept $4y = 5x - 12$

& $y = 1.25x - 3$

[2 marks]

27

A machine takes four hours to make one unit of Product A and three hours to make one unit of product B. Last month the machine operated for 200 hours producing a total of 60 units. How many units of Product A were made?

[4 marks]

Let the no. of units of A made be M

Let the no. of units of B made be N

$$4M + 3N = 200$$

$$M + N = 60$$

M1: for correct equation

M1: for correct equation

$$4M + 3N = 200$$

$$4M + 4N = 240$$

M1: for matching coefficients

$$N = 40$$

$$M = 20$$

A1: answer for M

○ *Allow for other methods to reach a solution*

$$4M + 3N = 200$$

$$M = 60 - N$$

M1

M1

$$240 - 4N + 3N = 200$$

$$240 - N = 200$$

$$N = 40$$

$$M = 20$$

M1

A1

$$4M + 3N = 200$$

$$M + N = 60$$

$$4M + 3N = 200$$

$$3M + 3N = 180$$

$$M = 20$$

M1

M1

M1

A1