HSC Mathematics

General 2

Mr Job

http://gomaths.net/4992

Today

Study – what and how

and

The Exam – tips

Study

Example 1

Subjects cycle every two days… but they also cycle the time when you study them.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Wake, ready, breakfast.							
Morning	Maths	Senior Science	Business Studies	PDHPE	English	CAFS	Day Off
Lunch / long break							
Afternoon	Business Studies	PDHPE	English	CAFS	Senior Science	Maths	Day Off
Dinner / break / walk?							
Night	English	CAFS	Senior Science	Maths	PDHPE	Business Studies	Day Off

Example 2

Only two subjects a day, Night should be used to consolidate on the days work, of HSC papers....

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Wake, ready, breakfast.							
Morning	Maths	English	PDHPE	Business Studies	Senior Science	CAFS	Day Off
Lunch / long break							
Afternoon	Business Studies	Senior Science	CAFS	Maths	English	PDHPE	Day Off
Dinner / break / walk?							
Night	Maths/Bus. Stu.	English / Sen. Sci.	PDHPE / CAFS	Bus. Stu. / Maths	Sen. Sci. / English	CAFS / PDHPE	Day Off

Week 1	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Wake, ready, breakfast.							
Morning							
Lunch / long break							
Afternoon							
Dinner / break / walk?							
Night							

Week 2	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Wake, ready, breakfast.							
Morning							
Lunch / long break							
Afternoon							
Dinner / break / walk?							
Night							

Study **P-R-A-C**

1. **P**ractise questions – master skills
    - By Topic
2. **R**ewrite:
    - Annotate the Formula and Data sheet
    - Save questions that helped you learn, re-attempt
3. **A**ttack – work to overcome areas of weakness
4. **C**heck
    - Past Papers – in exam conditions

Close to exam

- Review your summaries / FDS
- Review saved questions
- Review Exam plan [more later]

General Maths vs Maths General 2

Past HSC Papers

2001 to 2013: General Mathematics

- Almost all of the HSC questions are still relevant to Maths General 2

2014 onwards: Mathematics General 2

Past Paper

Source of past papers - see web-site

Preliminary Mathematics General Course*		HSC Mathematics General 2 Course
Strand:	**Financial Mathematics**	Approximately 25% of the marks in the HSC Exam come from the Preliminary Course. Including the Focus Studies.
FM1	Earning and managing money	
FM2	Investing money	
FM3	Taxation	
Strand:	**Data and Statistics**	
DS1	Statistics and society, data collection and sampling	
DS2	Displaying and interpreting single data sets	
DS3	Summary statistics	
Strand:	**Measurement**	
MM1	Units of measurement and applications	
MM2	Applications of perimeter, area and volume	
MM3	Similarity of two-dimensional figures, right-angled triangles	
Strand:	**Probability**	
PB1	Relative frequency and probab	
Strand:	**Algebra and Modelling**	
AM1	Algebraic manipulation	
AM2	Interpreting linear relationships	
Focus Study:	**Mathematics and Communication**	
FSCo1	Mobile phone plans	
FSCo2	Digital download and file storage	
Focus Study:	**Mathematics and Driving**	
FSDr1	Costs of purchase and insurance	
FSDr2	Running costs and depreciation	
FSDr3	Safety	

* The Preliminary Mathematics General course is undertaken by all students intending to study either the HSC Mathematics General 2 course or the HSC Mathematics General 1 course.

Preliminary Mathematics General Course*		HSC Mathematics General 2 Course	
Strand:	**Financial Mathematics**	**Strand:**	**Financial Mathematics**
FM1	Earning and managing money	FM4	Credit and borrowing
FM2	Investing money	FM5	Annuities and loan repayments
FM3	Taxation		
Strand:	**Data and Statistics**	**Strand:**	**Data and Statistics**
DS1	Statistics and society, data collection	DS4	Interpreting sets of data
Focus Study:	**Mathematics and Communi**	**Study:**	**Mathematics and Health**
FSCo1	Mobile phone plans	FSHe1	Body measurements
FSCo2	Digital download and file storage	FSHe2	Medication
		FSHe3	Life expectancy
Focus Study:	**Mathematics and Driving**	**Focus Study:**	**Mathematics and Resources**
FSDr1	Costs of purchase and insurance	FSRe1	Water availability and usage
FSDr2	Running costs and depreciation	FSRe2	Dams, land and catchment areas
FSDr3	Safety	FSRe3	Energy and sustainability
* The Preliminary Mathematics General course is undertaken by all students intending to study either the HSC Mathematics General 2 course or the HSC Mathematics General 1 course.			

Approximately one-third of the marks in the HSC Examination should be from the Focus Studies

The basics

HSC exam equipment list

You should write in black pen. Make sure you bring spare pens to each examination. You may also bring a ruler, highlighters, pencils (at least 2B), a sharpener and a bottle of water in a clear bottle. Watches are permitted, but once you sit down in the examination room you must remove your watch and place it in clear view on your desk. Programmable watches, including smart watches, are NOT allowed in examination rooms.

The following list shows examinations that require specific equipment. Optional items listed can be used in exams but are not essential.

All equipment is subject to inspection on entry. Ensure any allowed equipment, such as a calculator, is in good working order because an appeal under misadventure provisions for equipment failure will not be upheld.

What you *cannot* bring into your examination room

- ✗ A mobile phone. Mobile phones are not permitted in an examination room under any circumstances.
- ✗ A programmable watch such as a smart watch.
- ✗ Any electronic device (except a calculator where permitted). This includes mobile phones or other communication devices, organisers, tablets/iPads, music players or electronic dictionaries.
- ✗ Paper or any printed or written material (including your examination timetable).
- ✗ Dictionaries, except where permitted in language examinations.
- ✗ Correction fluid.

You are *not* allowed to borrow equipment during examinations.

Equipment for specific HSC exams

This list details specific equipment that students are expected to bring for particular examinations. Only those examinations that require specific equipment are listed. For a list of NESA-approved calculators, please visit educationstandards.nsw.edu.au/hsc/rules-and-processes/approved-calculators.

Agriculture
- ✓ NESA-approved calculator

Automotive (VET)
- ✓ NESA-approved calculator

Biology
- ✓ NESA-approved calculator

Business Services (VET)
- ✓ NESA-approved calculator

Business Studies
- ✓ NESA-approved calculator

Chemistry
- ✓ NESA-approved calculator

Construction (VET)
- ✓ NESA-approved calculator

Earth and Environmental Science
- ✓ NESA-approved calculator
- ✓ pair of compasses
- ✓ protractor
- ✓ set squares

Economics
- ✓ NESA-approved calculator

Electrotechnology (VET)
- ✓ NESA-approved calculator

Engineering Studies
- ✓ NESA-approved calculator
- ✓ pair of compasses
- ✓ protractor
- ✓ set squares
- ✓ (optional) circle templates including isometric/ellipse

Entertainment Industry (VET)
- ✓ NESA-approved calculator

Financial Services (VET)
- ✓ NESA-approved calculator

Geography
- ✓ NESA-approved calculator
- ✓ pair of dividers
- ✓ pair of compasses
- ✓ protractor
- ✓ coloured pencils and/or coloured felt pens
- ✓ (optional) a handheld magnifying glass
- ✓ (optional) a piece of string or thread for measuring

Hospitality (VET)
- ✓ NESA-approved calculator

Human Services (VET)
- ✓ NESA-approved calculator

Industrial Technology
- ✓ NESA-approved calculator
- ✓ pair of compasses
- ✓ protractor
- ✓ set squares

Information and Digital Technology (VET)
- ✓ NESA-approved calculator

Information Processes and Technology

Calculators are NOT permitted.

Latin
- ✓ Unannotated print dictionaries are permitted for Latin Continuers and Latin Extension

Mathematics General 2, Mathematics, Mathematics Extension 1, Mathematics Extension 2
- ✓ NESA-approved calculator
- ✓ pair of compasses
- ✓ protractor
- ✓ set squares
- ✓ (optional) a curve drawing template[1]

Metal and Engineering (VET)
- ✓ NESA-approved calculator

Modern Languages (Beginners, Continuers, Extension, [Languages] in Context, [Languages] and Literature)
- ✓ Any unannotated print dictionary

Physics
- ✓ NESA-approved calculator
- ✓ pair of compasses
- ✓ protractor
- ✓ set squares

Primary Industries (VET)
- ✓ NESA-approved calculator

Retail Services (VET)
- ✓ NESA-approved calculator

Senior Science
- ✓ NESA-approved calculator
- ✓ pair of compasses
- ✓ protractor
- ✓ set squares

Software Design and Development

Calculators are NOT permitted.

Tourism, Travel and Events (VET)
- ✓ NESA-approved calculator

Note:

[1] Students may take into any HSC mathematics examination, templates for drawing curves and geometrical figures, measuring, constructing, etc. Such templates may contain equations of simple curves (eg $y = x^2$, $y = \sin x$, $y = \frac{1}{x}$) that can be drawn using the template, and decimal approximations (eg for pi, e), but no other printed formulae (eg sine rule, cosine rule, quadratic formulae, area and volume formulae). Acceptable templates include Mathomat, Mathomat Senior and (Non Formulae).

http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/hsc/key-dates-exam-timetables/hsc-written-exam-timetable

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- ✓ protractor
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Entertainment Industry (VET)
- ✓ NESA-approved calculator

Financial Services (VET)
- ✓ NESA-approved calculator

Geography
- ✓ NESA-approved calculator
- ✓ pair of dividers
- ✓ pair of compasses
- ✓ protractor
- ✓ coloured pencils and/or coloured felt pens

Mathematics Extension 1, Mathematics Extension 2
- ✓ NESA-approved calculator
- ✓ pair of compasses
- ✓ protractor
- ✓ set squares
- ✓ (optional) a curve drawing template[1]

Metal and Engineering (VET)
- ✓ NESA-approved calculator

Modern Languages (Beginners, Continuers, Extension, [Languages] in Context, [Languages] and Literature)
- ✓ Any unannotated print dictionary

Physics
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- ✓ protractor
- ✓ set squares

Primary Industries (VET)
- ✓ NESA-approved calculator

Retail Services (VET)
- ✓ NESA-approved calculator

Senior Science
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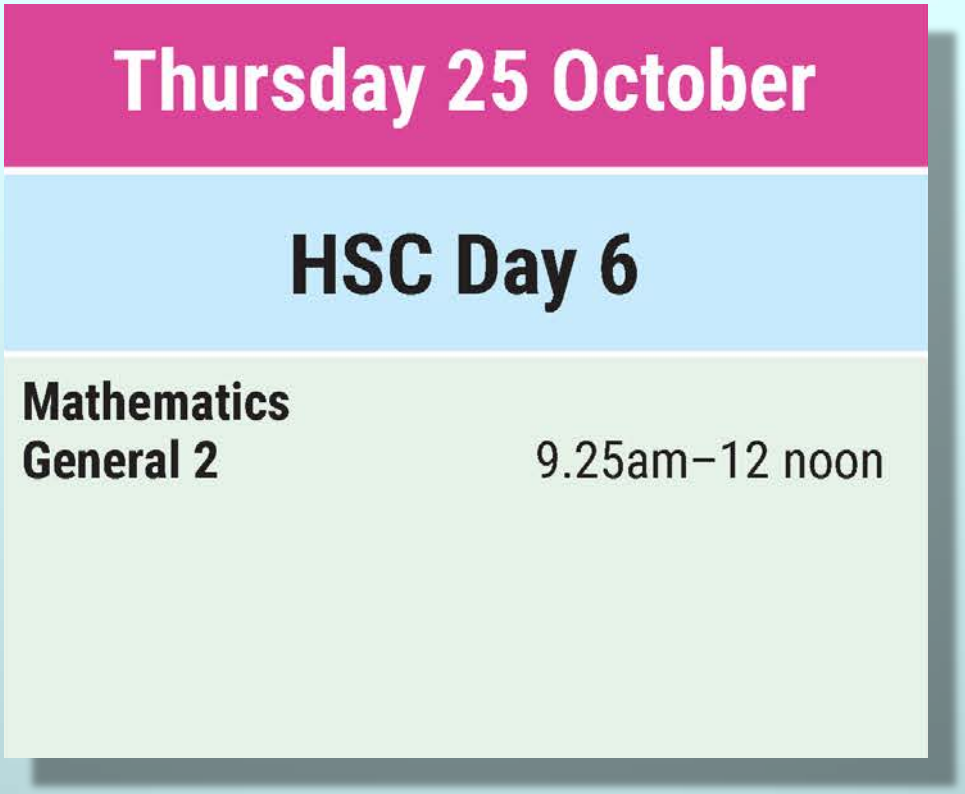
Mathematics General 2

- ✓ NESA-approved calculator
- ✓ pair of compasses
- ✓ protractor
- ✓ set squares
- ✓ (optional) a curve drawing template[1]

2018 HSC Written Exam Timetable • Week 2

	Monday 22 October	Tuesday 23 October	Wednesday 24 October	Thursday 25 October	Friday 26 October
	HSC Day 3	HSC Day 4	HSC Day 5	HSC Day 6	HSC Day 7
AM	Legal Studies 9.25am–12.30pm Arabic Continuers 9.30am–12.30pm Classical Hebrew Extension 9.30am–11.30am	Ancient History 9.25am–12.30pm Financial Services (VET) 9.25am–11.30am Chinese in Context 9.30am–12.10pm	Biology 9.25am–12.30pm Classical Hebrew Continuers 9.25am–12.30pm	Mathematics General 2 9.25am–12 noon	Senior Science 9.25am–12.30pm Chinese Extension 9.30am–11.30am
PM	Latin Continuers 1.55pm–5.00pm Visual Arts Art Criticism and Art History 1.55pm–3.30pm Indonesian Extension 2.00pm–4.00pm Indonesian in Context 2.00pm–4.40pm Indonesian and Literature 2.00pm–5.00pm Korean Continuers 2.00pm–5.00pm	Agriculture 1.55pm–5.00pm Classical Greek Continuers 1.55pm–5.00pm Armenian Continuers† 2.00pm–4.40pm Croatian Continuers† 2.00pm–4.40pm Dutch Continuers† 2.00pm–4.40pm Filipino Continuers† 2.00pm–4.40pm Hindi Continuers† 2.00pm–4.40pm Hungarian Continuers† 2.00pm–4.40pm Italian Continuers 2.00pm–5.00pm Japanese Continuers 2.00pm–5.00pm Khmer Continuers† 2.00pm–4.40pm Macedonian Continuers† 2.00pm–4.40pm Maltese Continuers† 2.00pm–4.40pm Modern Greek Beginners 2.00pm–4.40pm Persian Background Speakers† 2.00pm–5.00pm Polish Continuers† 2.00pm–4.40pm Portuguese Continuers† 2.00pm–4.40pm Punjabi Continuers† 2.00pm–4.40pm Russian Continuers† 2.00pm–4.40pm Serbian Continuers† 2.00pm–4.40pm Swedish Continuers† 2.00pm–4.40pm Tamil Continuers† 2.00pm–4.40pm Turkish Continuers† 2.00pm–4.40pm Ukrainian Continuers† 2.00pm–4.40pm	Construction (VET) 1.55pm–4.00pm Tourism, Travel and Events (VET) 1.55pm–4.00pm Arabic Beginners 2.00pm–4.40pm Arabic Extension 2.00pm–4.00pm Chinese Beginners 2.00pm–4.40pm Chinese Continuers 2.00pm–5.00pm German Beginners 2.00pm–4.40pm German Continuers 2.00pm–5.00pm Indonesian Continuers 2.00pm–5.00pm Korean Beginners 2.00pm–4.40pm Malay Background Speakers† 2.00pm–5.00pm	Mathematics 1.55pm–5.00pm Mathematics Extension 2 1.55pm–5.00pm	Business Services (VET) 1.55pm–4.00pm History Extension 1.55pm–4.00pm Metal and Engineering (VET) 1.55pm–4.00pm Chinese and Literature 2.00pm–5.00pm German Extension 2.00pm–4.00pm

† Collaborative Curriculum and Assessment Framework for Languages (CCAFL)



The timetable's examination starting time is when reading time begins. Arrive at your examination venue well before the time specified.

The Exam

NSW EDUCATION STANDARDS AUTHORITY

2017 | HIGHER SCHOOL CERTIFICATE EXAMINATION

Mathematics General 2

General Instructions

- Reading time – 5 minutes
- Working time – $2\frac{1}{2}$ hours
- Write using black pen
- NESA approved calculators may be used
- A formulae and data sheet is provided at the back of this paper
- In Questions 26–30, show relevant mathematical reasoning and/or calculations

Total marks: 100

Section I – 25 marks (pages 2–12)

- Attempt Questions 1–25
- Allow about 35 minutes for this section

Section II – 75 marks (pages 13–36)

- Attempt Questions 26–30
- Allow about 1 hour and 55 minutes for this section

General Instructions

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PLAN and stick to it

General Instructions

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- Write using black pen
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- In Questions 26–30, show relevant mathematical reasoning and/or calculations

Total marks: 100

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- In Questions 26–30, show relevant mathem and/or calculations

How will you use it?

Exam plan

Reading time – 5 minutes

Read the whole paper – not recommended

or

Reading time – 5 minutes

Read just the multiple choice

16 The benchmark for annual greenhouse gas emissions from the residential sector is 3292 kg of carbon dioxide per person per year.

A new building, planned to house 6 people, has been designed to achieve a 25% reduction on this benchmark.

What is the maximum amount of carbon dioxide per year, to the nearest kilogram, that this building is designed to emit when fully occupied?

A. 823 kg

B. 2469 kg

C. 4938 kg

D. 14 814 kg

or

Reading time – 5 minutes

Read Question 26

Question 26 (15 marks)

(a) Electricity costs $0.27 per kWh. **1**

How much does 20 kWh cost?

.....

.....

(b) Toby's mobile phone plan costs $20 per month, plus the cost of all calls. Calls are charged at the rate of 70 cents per 30 seconds, or part thereof. There is also a call connection fee of 50c per call. **2**

Here is a record of all his calls in July.

Date	*Call duration*
5 July	20 seconds
12 July	40 seconds
23 July	2 minutes 15 seconds

or

Reading time – 5 minutes

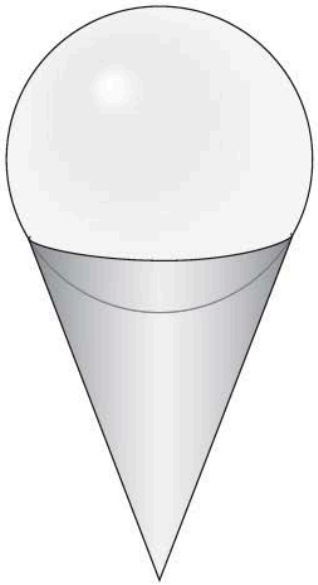
Read some of the hard (3 or 4 mark), wordy questions near the end

Question 30 (continued)

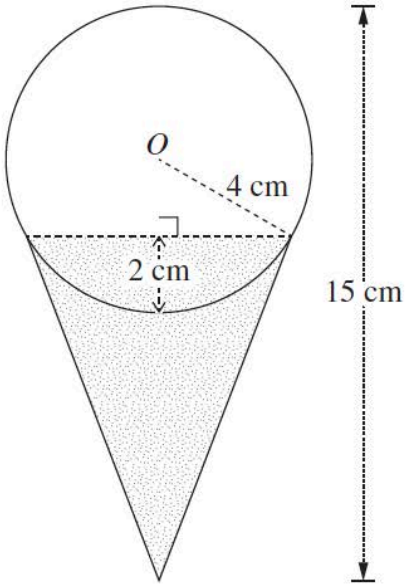
(e) A solid is made up of a sphere sitting partially inside a cone. **3**

The sphere, centre O, has a radius of 4 cm and sits 2 cm inside the cone. The solid has a total height of 15 cm. The solid and its cross-section are shown.

Solid



Cross-section



NOT TO SCALE

What is the volume of the cone, correct to the nearest cm^3?

Reading time – 5 minutes

Read the whole paper – not recommended

or

Read just the multiple choice

or

Read Question 26

or

Read some of the hard, wordy questions near the end

Action: Reading Time

4. Reading time, choose:
   - ☐ Read just the multiple choice, or
   - ☐ Read Question 26
   - ☐ Read some of the hard, wordy questions near the end

Action: Reading Time

4. Reading time, choose:
   - ☑ Read just the multiple choice, or
   - ☐ ~~Read Question 26~~
   - ☐ ~~Read some of the hard, wordy questions near the end~~

Exam plan – time allocation

Time	150 minutes available
9:25	
	Reading time
9:30	
	Try to do all 25 multiple-choice questions (25 marks in 40 minutes)
10:10	Move on and come back later if necessary!
	Questions 26, 27, 28 (45 marks in 60 minutes)
11:10	
	Questions 29, 30 (30 marks in 40 minutes)
11:50	
	Finish the multiple choice and any other missed parts Check your work
12 noon	

Time	150 minutes available
9:25	**Reading time**
9:30	
12 noon	

2016 HIGHER SCHOOL CERTIFICATE EXAMINATION

Mathematics General 2

FORMULAE AND DATA SHEET

Financial Mathematics

Simple Interest

$$I = Prn$$

- P is initial amount
- r is interest rate per period, expressed as a decimal
- n is number of periods

Compound Interest

$$A = P(1+r)^n$$

- A is final amount
- P is initial amount
- r is interest rate per period, expressed as a decimal
- n is number of compounding periods

Present value and future value

$$PV = \frac{FV}{(1+r)^n}, \quad FV = PV(1+r)^n$$

- r is interest rate per period, expressed as a decimal
- n is number of compounding periods

Straight-line method of depreciation

$$S = V_0 - Dn$$

- S is salvage value of asset after n periods
- V_0 is initial value of asset
- D is amount of depreciation per period
- n is number of periods

Declining-balance method of depreciation

$$S = V_0(1-r)^n$$

- S is salvage value of asset after n periods
- V_0 is initial value of asset
- r is depreciation rate per period, expressed as a decimal
- n is number of periods

Data A

Mean of a sample

$$\bar{x} = \frac{\text{sum}}{\text{numb}}$$

z-score

For any score x,

$$z =$$

- $\bar{x}$ is mean
- s is standard deviat

Outlier(s)

score(s) less than

or

score(s) more tha

- Q_L is lower quartile
- Q_U is upper quartile
- IQR is interquartile ran

Least-squares line of bes

$$y = \text{gradient}$$

$$\text{gradient} = r \times \frac{\text{stan}}{\text{stan}}$$

$$y\text{-intercept} = \bar{y} - (\text{gra}$$

- r is correlation coef
- $\bar{x}$ is mean of x scor
- $\bar{y}$ is mean of y scor

Normal distribution

- approximately 68% z-scores between
- approximately 95% z-scores between
- approximately 99. z-scores between

Spherical Geometry

Circumference of a circle

$$C = 2\pi r \quad \text{or} \quad C = \pi D$$

- r is radius
- D is diameter

Arc length of a circle

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- θ is number of degrees in central angle

Radius of Earth

(taken as) 6400 km

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For calculation of time differences using longitude:
15° = 1 hour time difference

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$$A = \pi r^2$$

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$$A = \pi\left(R^2 - r^2\right)$$

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Trapezium

$$A = \frac{h}{2}(a+b)$$

- h is perpendicular height
- a and b are the lengths of the parallel sides

Area of land and catchment areas

unit conversion: $1 \text{ ha} = 10\,000 \text{ m}^2$

Surfa

Sphere

$$A =$$

- r is radius

Closed cylinder

$$A = 2\pi$$

- r is radius
- h is perpendicular h

Vo

Prism or cylinder

$$V =$$

- A is area of base
- h is perpendicular h

Pyramid or cone

$$V =$$

- A is area of base
- h is perpendicular h

Volume and capacity

unit conversion: 1 m

Approximation Us

Area

$$A \approx \frac{h}{3}\{d_f$$

- h is distance betwe
- d_f is first measureme
- d_m is middle measure
- d_l is last measureme

Volume

$$V \approx \frac{h}{3}\{A_L$$

- h is distance betwe
- A_L is area of left end
- A_M is area of middle
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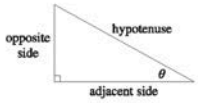
Trigonometric Ratios



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Sine rule

In $\triangle ABC$,

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Gradient–intercept form

$$y = mx + b$$

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How to use formulae

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$c^2 = a^2 + b^2 - 2ab\cos C$

$AB^2 = 287^2 + 211^2 - 2 \times 287 \times 211 \times \cos 114°$

$= 176151.5018$

$\therefore AB = \sqrt{176151.5018}$

$= 419.7040645$

$\approx 420\text{m}$ (nearest metre)

Begin → Brain dump

2016 HIGHER SCHOOL CERTIFICATE EXAMINATION

Mathematics General 2

FORMULAE AND DATA SHEET

Financial Mathematics

Simple Interest

$$I = Prn$$

- P is initial amount
- r is interest rate per period, expressed as a decimal
- n is number of periods

Compound Interest

$$A = P(1+r)^n$$

- A is final amount
- P is initial amount
- r is interest rate per period, expressed as a decimal
- n is number of compounding periods

Present value and future value

$$PV = \frac{FV}{(1+r)^n}, \quad FV = PV(1+r)^n$$

- r is interest rate per period, expressed as a decimal
- n is number of compounding periods

Straight-line method of depreciation

$$S = V_0 - Dn$$

- S is salvage value of asset after n periods
- V_0 is initial value of asset
- D is amount of depreciation per period
- n is number of periods

Declining-balance method of depreciation

$$S = V_0(1-r)^n$$

- S is salvage value of asset after n periods
- V_0 is initial value of asset
- r is depreciation rate per period, expressed as a decimal
- n is number of periods

Data A

Mean of a sample

$$\bar{x} = \frac{\text{sum}}{\text{numb}}$$

z-score

For any score x,

$$z =$$

- $\bar{x}$ is mean
- s is standard deviat

Outlier(s)

score(s) less than

or

score(s) more tha

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- Q_U is upper quartile
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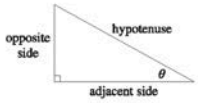

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You can add stuff to the Formulae and Data Sheet

Units of Memory and File Size

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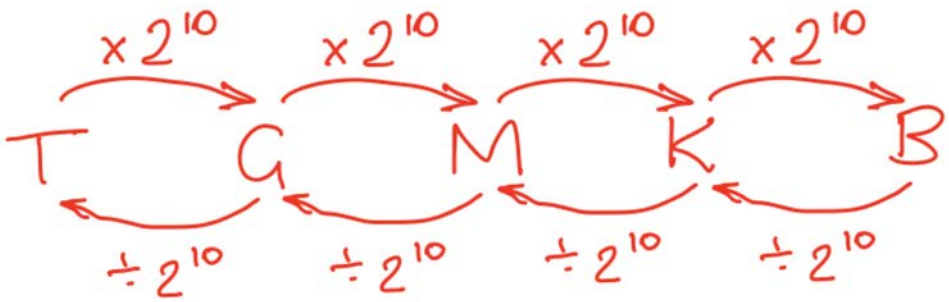
K 1 kilobyte = 2^{10} bytes = 1024 bytes

M 1 megabyte = 2^{20} bytes = 1024 kilobytes

G 1 gigabyte = 2^{30} bytes = 1024 megabytes

T 1 terabyte = 2^{40} bytes = 1024 gigabytes



5 How many kilobytes are there in 2 gigabytes?

(A) 2^{20}

(B) 2^{21}

(C) 2^{30}

(D) 2^{31}

Units of Memory and File Size

B 1 byte = 8 bits b

K 1 kilobyte = 2^{10} bytes = 1024 bytes

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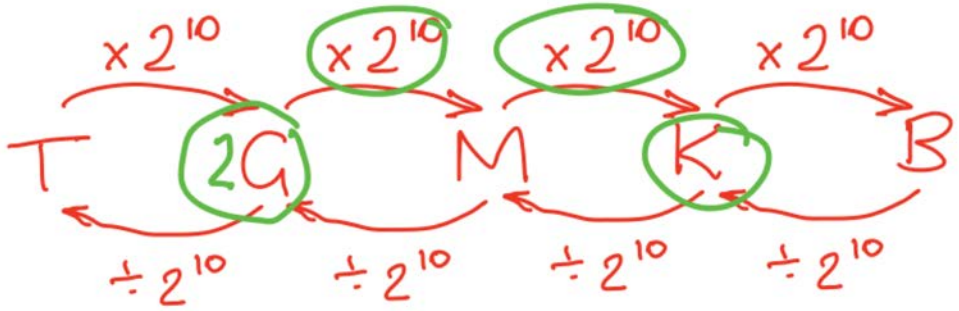


You can add stuff to the Formulae and Data Sheet

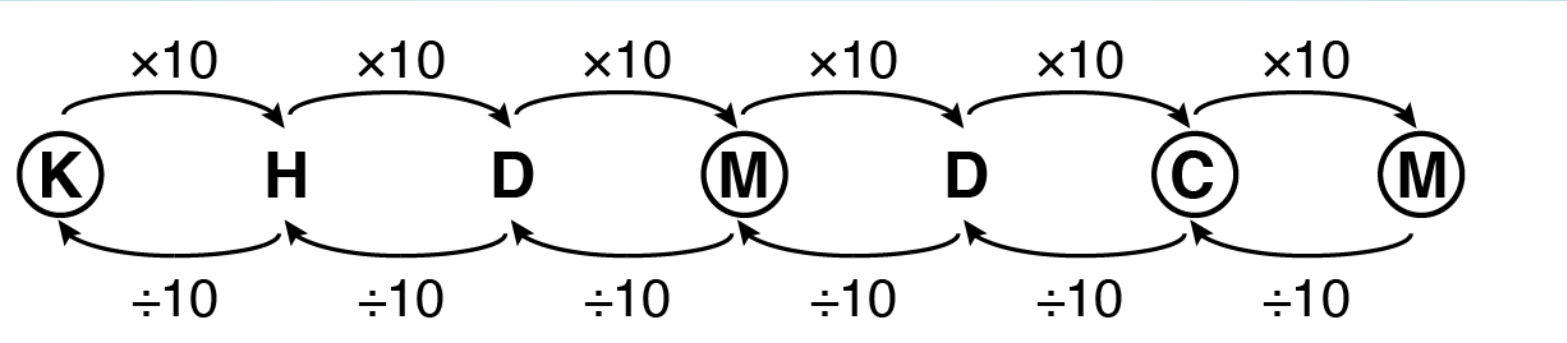
K	**H**	**D**	**M**	**D**	**C**	**M**

You can add stuff to the Formulae and Data Sheet

King **H**enry's **D**aughter **M**akes **D**elicious **C**hocolate **M**uffins

You can add stuff to the Formulae and Data Sheet

You can add stuff to the Formulae and Data Sheet



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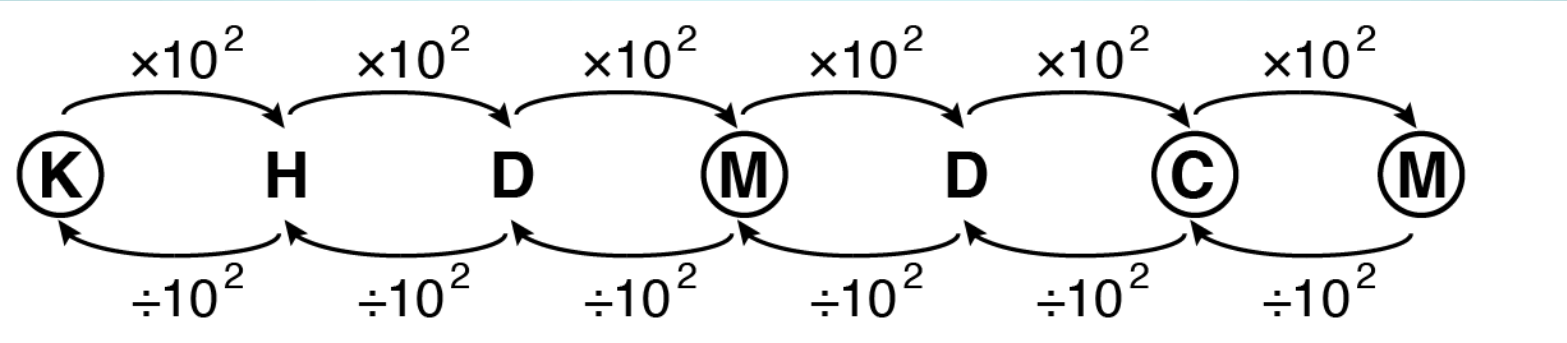

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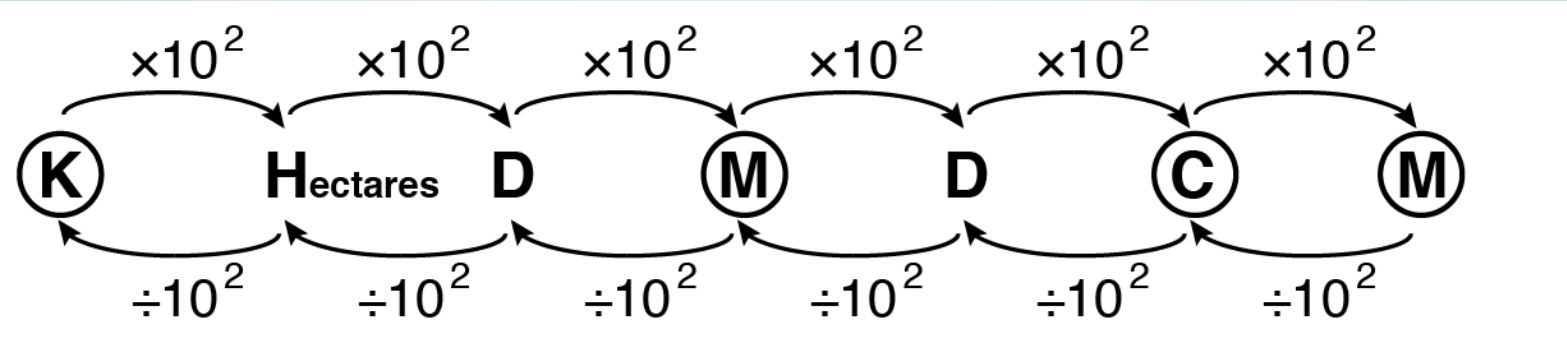
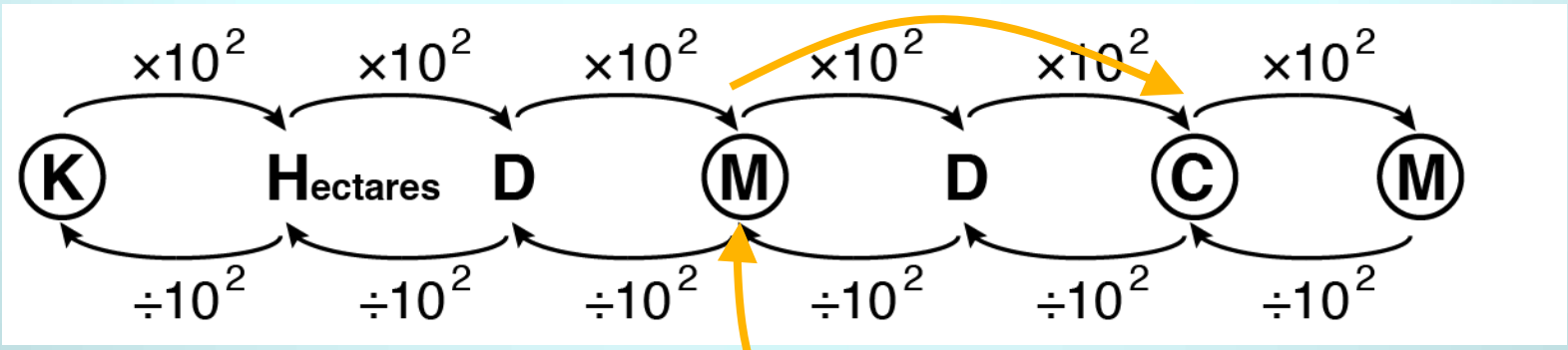




12 How many square centimetres are in 0.0075 square metres?

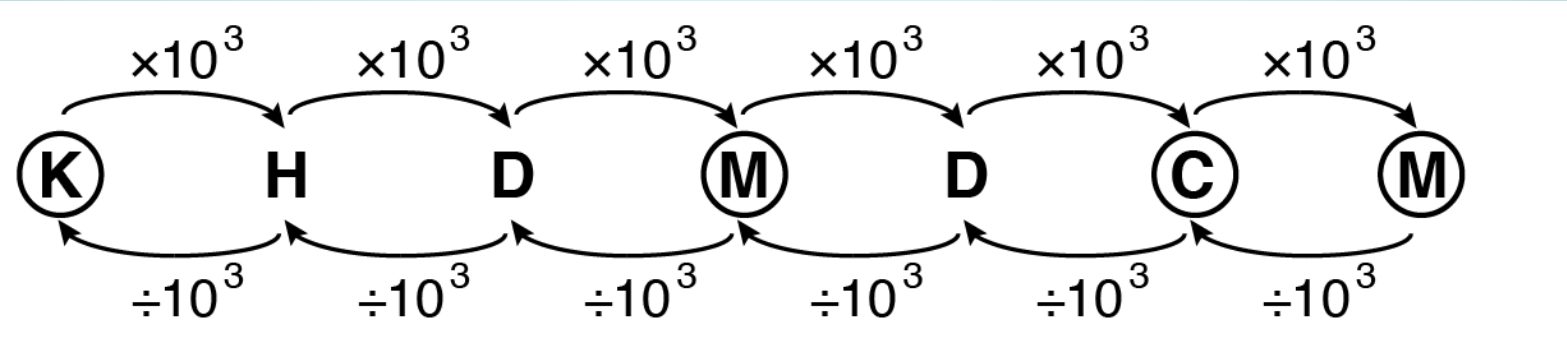
(A) 0.75

(B) 7.5

(C) 75

(D) 7500

You can add stuff to the Formulae and Data Sheet



You can add stuff to the Formulae and Data Sheet

Time differences

For calculation of time differences using longitude:

15° = 1 hour time difference

1° = 4 minutes

MULTIPLE CHOICE

Multiple choice

Questions 1 to 25

Success rates from 2013 HSC Examination

The questions with the **highest** success rates

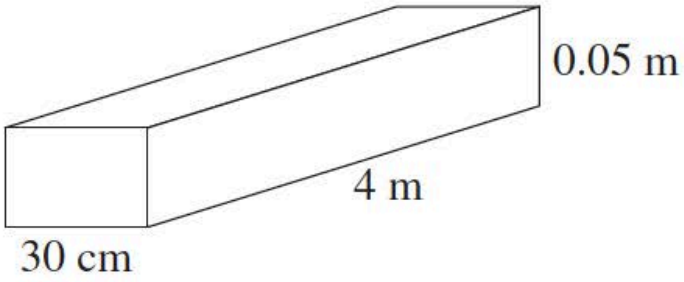
Question	8	7	4	10	1
Success rate	92%	78%	74%	72%	71%

The questions with the **lowest** success rates

Question	22	20	21	25	18
Success rate	24%	24%	26%	34%	35%

Multiple choice

6



NOT TO SCALE

What is the volume of this rectangular prism in cubic centimetres?

(A) 6 cm^3

(B) 600 cm^3

(C) 60 000 cm^3

(D) 6 000 000 cm^3

1 What is 0.000 000 326 mm expressed in scientific notation?

(A) 0.326×10^{-6} mm

(B) 3.26×10^{-7} mm

(C) 0.326×10^{6} mm

(D) 3.26×10^{7} mm

2 A measurement of 72 cm is increased by 20% and then the result is decreased by 20%.

What is the new measurement, correct to the nearest centimetre?

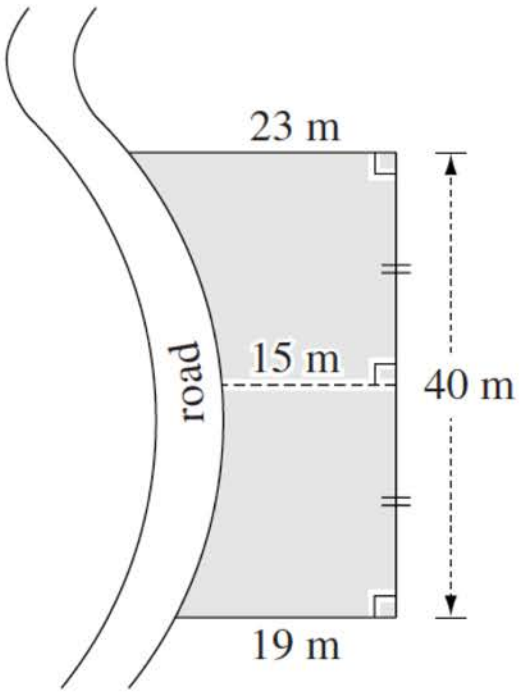
(A) 46 cm

(B) 69 cm

(C) 72 cm

(D) 104 cm

12 The shaded region represents a block of land bounded on one side by a road.



NOT
TO
SCALE

What is the approximate area of the block of land, using Simpson's rule?

(A) 680 m^2

(B) 760 m^2

(C) 840 m^2

(D) 1360 m^2

11 Simplify $6w^4 \times \frac{1}{3}w^2$.

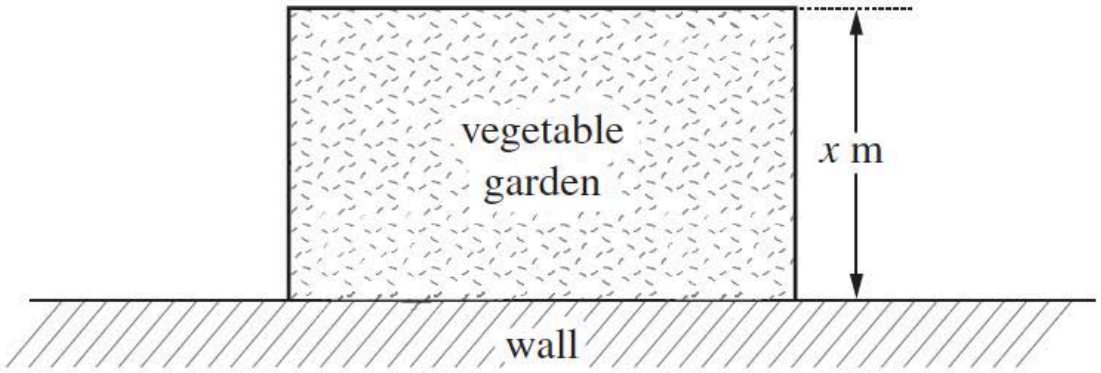
(A) $2w^6$

(B) $2w^8$

(C) $18w^6$

(D) $18w^8$

22 Leanne wants to build a rectangular vegetable garden in her backyard. She has 20 metres of fencing and will use a wall as one side of the garden. The plan for her garden is shown, where x metres is the width of her garden.



NOT TO
SCALE

Which equation gives the area, A, of the vegetable garden?

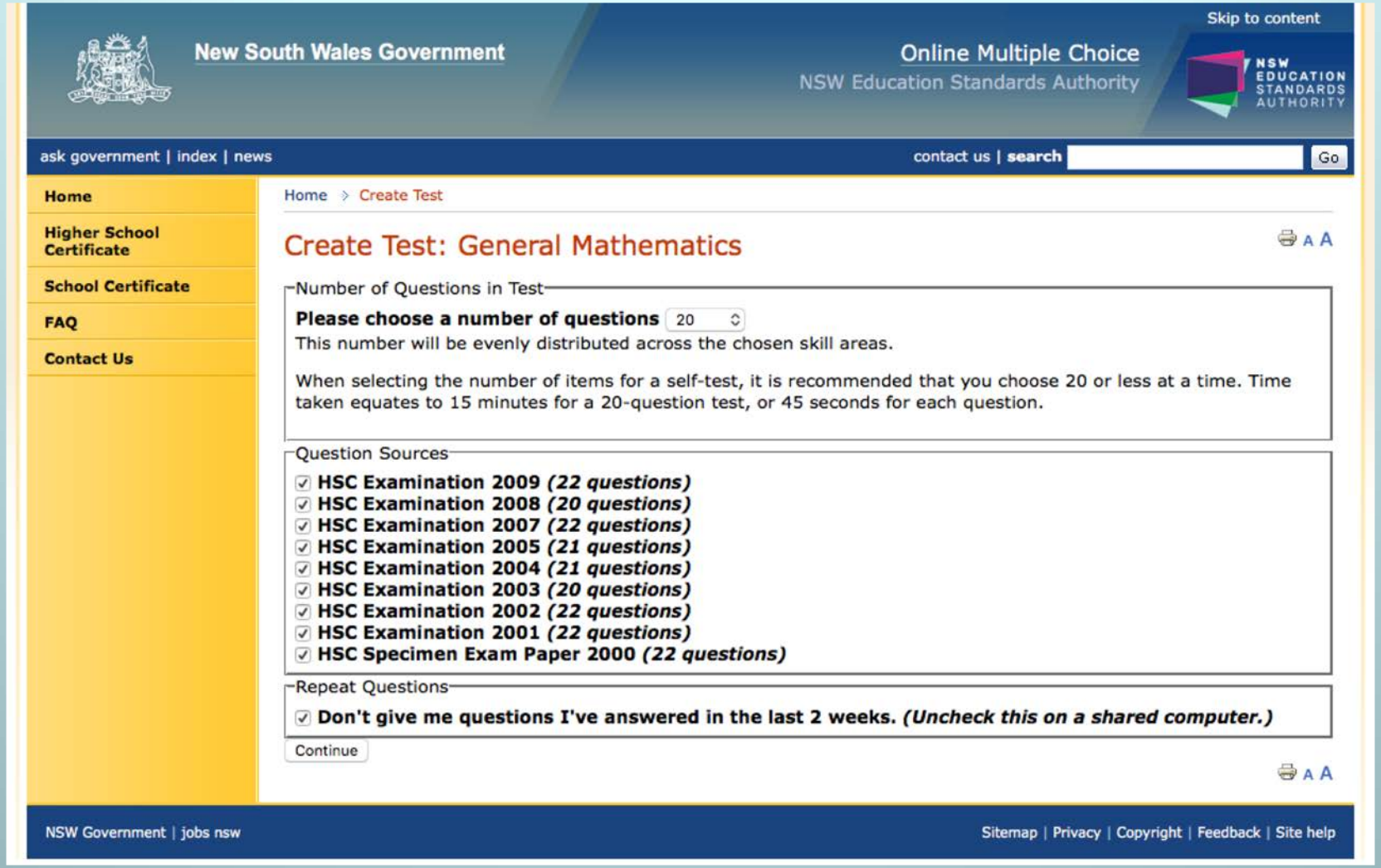
(A) $A = 10x - x^2$

(B) $A = 10x - 2x^2$

(C) $A = 20x - x^2$

(D) $A = 20x - 2x^2$

Online multiple choice



Google: `nesa online multiple choice`

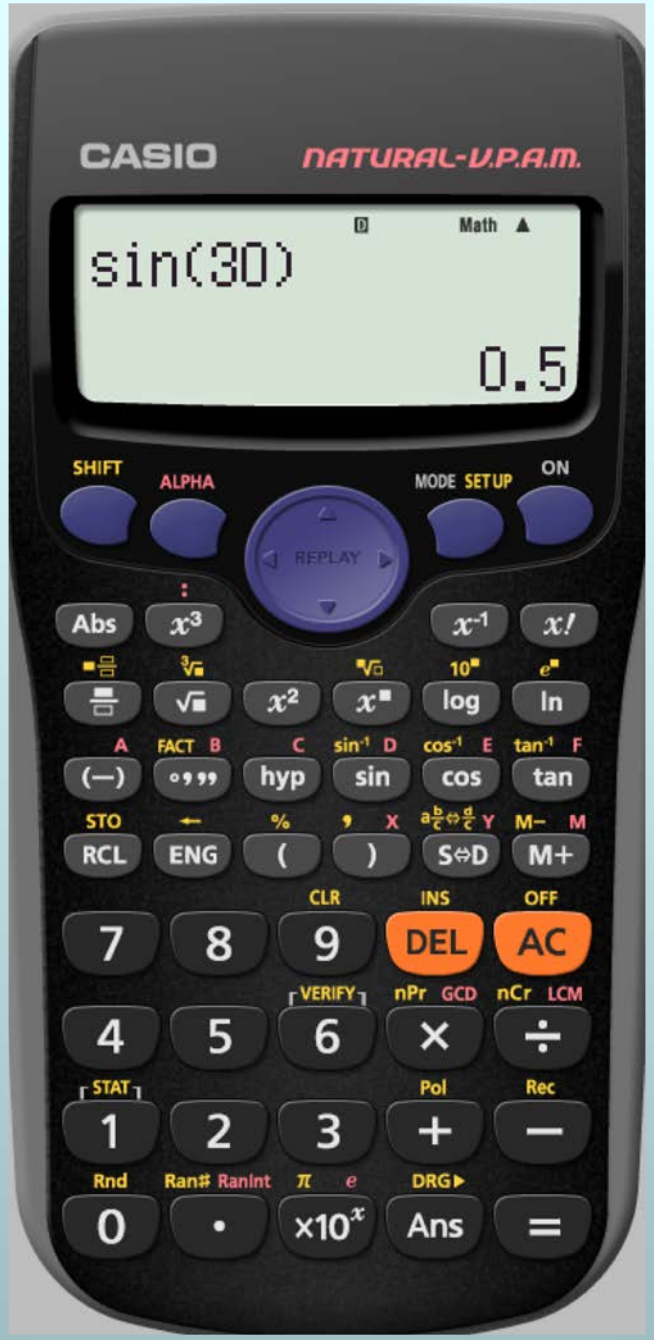
Calculator

It’s worth taking in 2 calculators. Borrow one.

Check your calculator is NESA approved.

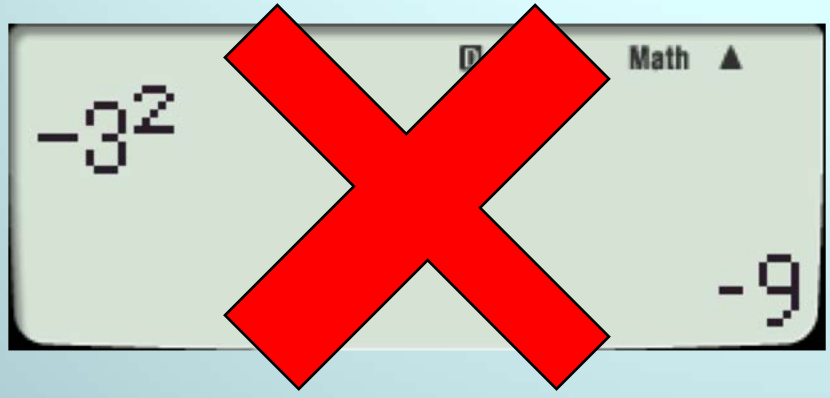
Calculator

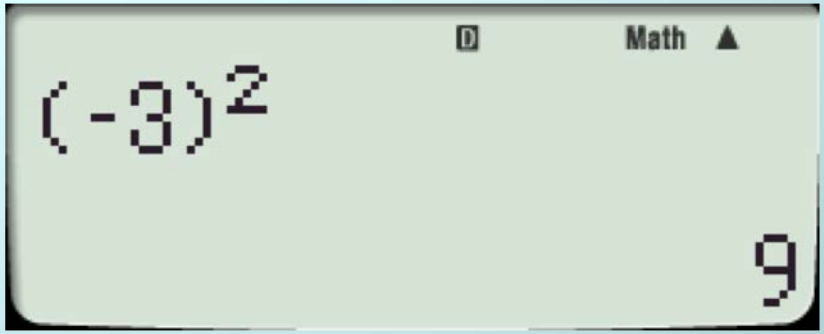
D



Calculator

The square of −3 is not −9.

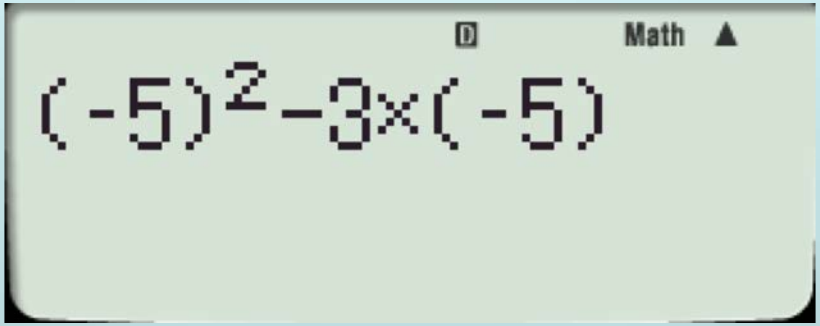




Calculator

If substituting:

$$a = -5 \text{ into } a^2 - 3a$$

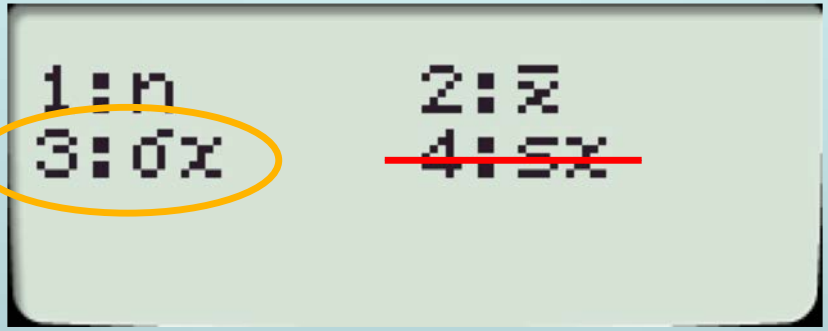


Calculator

Standard deviation

Use **population** standard deviation σx

not **sample** standard deviation sx



Calculator

Using the sine ratio, $\sin 28° = \frac{5}{h}$

$$h = \frac{5}{\sin 28°}$$

$$= 10.65027234$$

$$= 10.65 \text{ (2 dp)}$$

Calculator

What if you need to use this answer in part (ii)?

$$h = \frac{5}{\sin 28°}$$

$$= 10.65027234$$

$$= 10.65 \text{ (2 dp)}$$

ANS Key

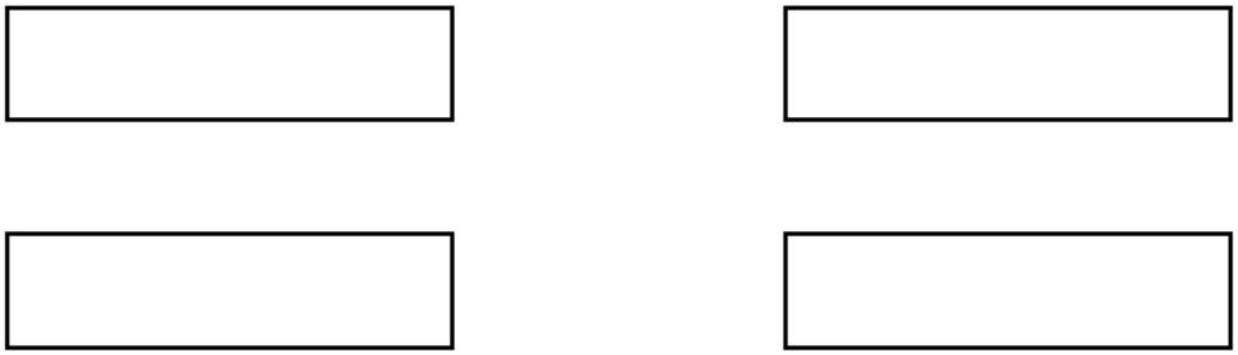
Or store this number in Memory

Four boxes, three numbers, two arrows and a red pen

Question 27

(c) A map has a scale of 1 : 500 000.

(i) Two mount peaks are 2 cm apart on the map. 1
What is the actual distance between the two mountain peaks, in kilometres?



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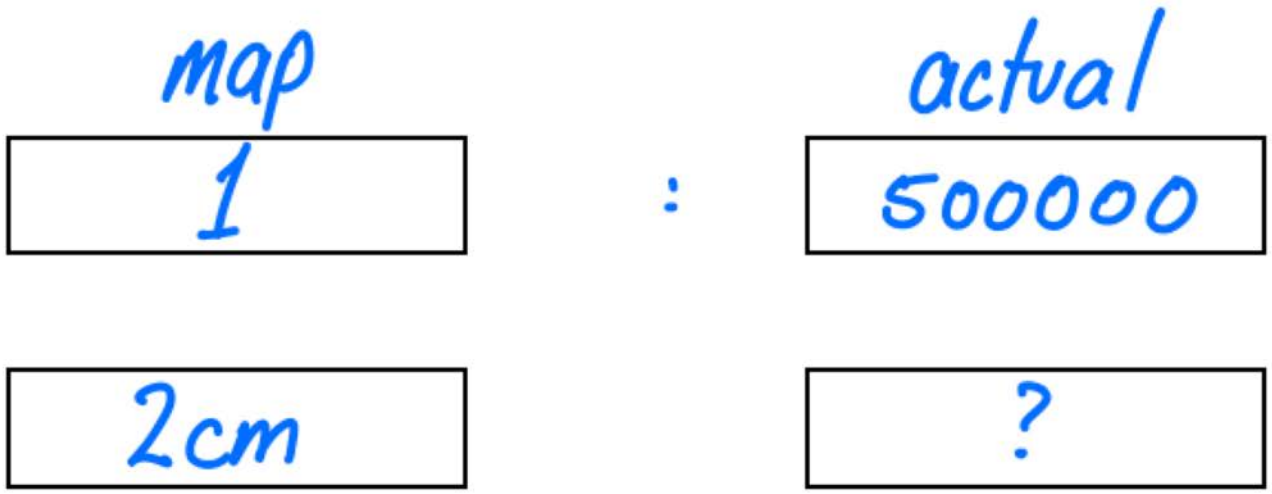

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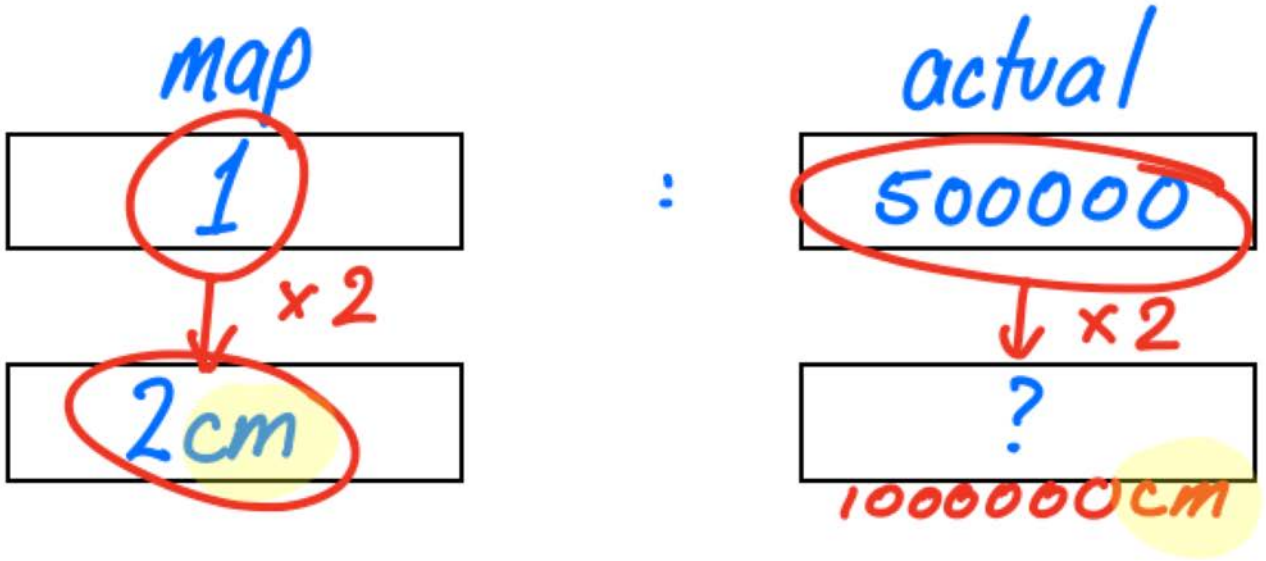

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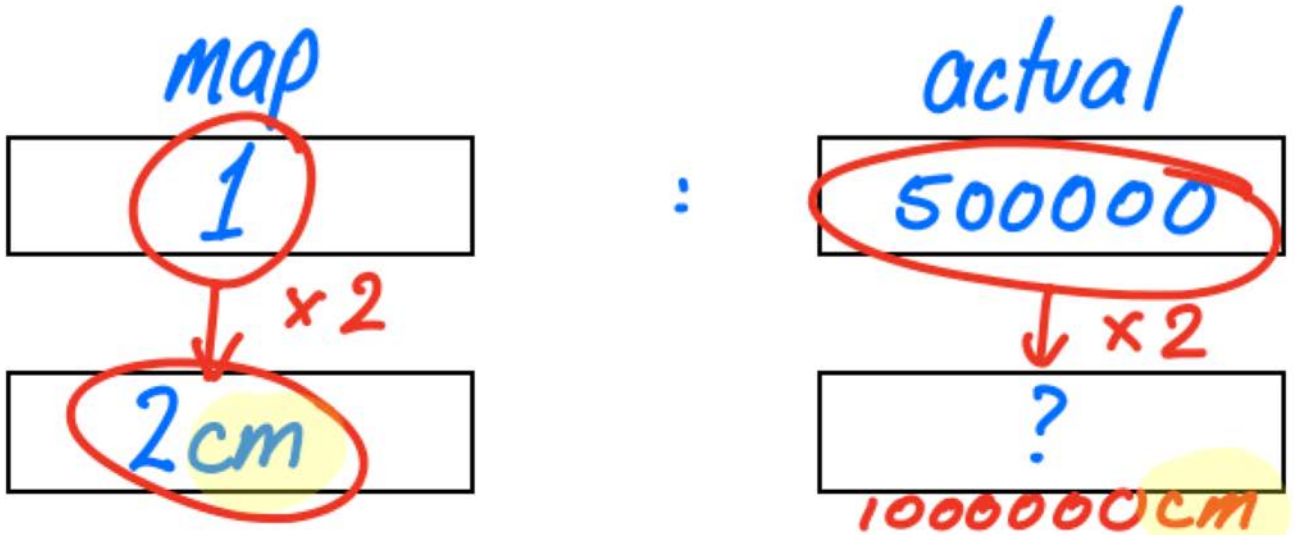
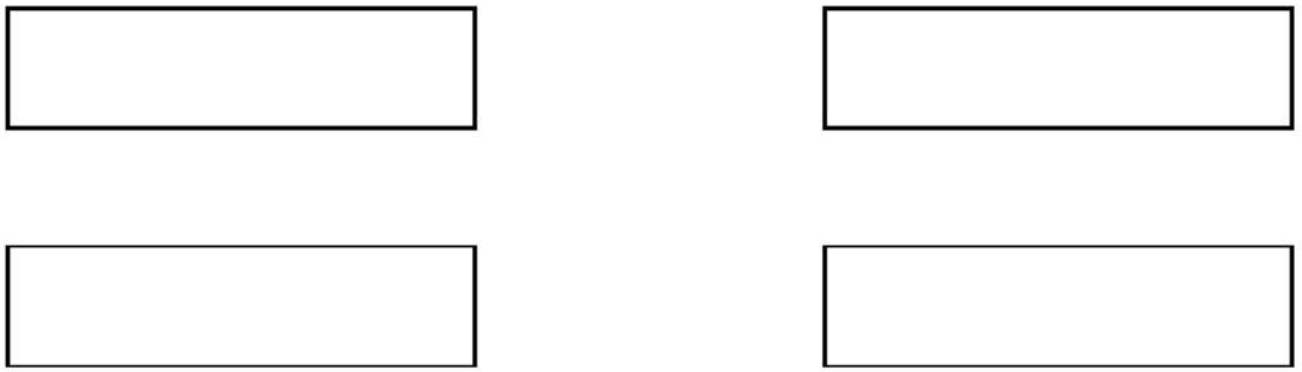


1000000cm = 10000m = 10 km

Four boxes, three numbers, two arrows and a red pen

(ii) Two cities are 75 km apart. 1
How far apart are the two cities on the map, in centimetres?



Four boxes, three numbers, two arrows and a red pen

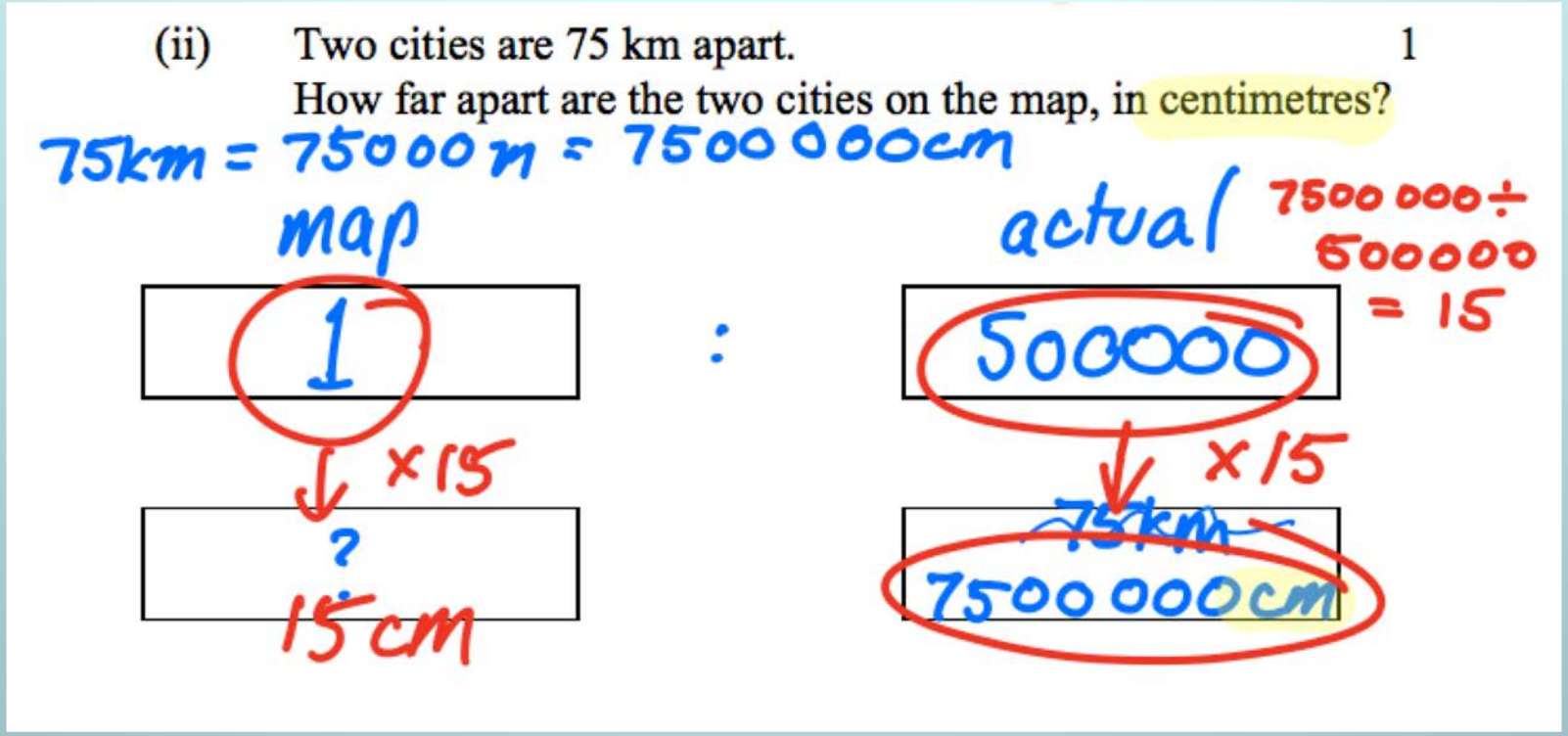
(ii) Two cities are 75 km apart. 1

How far apart are the two cities on the map, in centimetres?

75km = 75000 m = 7500000cm

map		actual
1	:	500000
?		75km = 7500000cm

Four boxes, three numbers, two arrows and a red pen



Using the writing spaces

(g) Rachel bought a motorcycle advertised for $7990. She paid a $500 deposit and took out a flat-rate loan to repay the balance. Simple interest was charged at a rate of 7% per annum on the amount borrowed. She repaid the loan over 2 years, making equal weekly repayments. **3**

Calculate the weekly repayment.

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Using the writing spaces

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Calculate the weekly repayment.

Start here, work down.

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final answer goes last

Just in case
~~~

Using the writing spaces

(g) Rachel bought a motorcycle advertised for $7990. She paid a $500 deposit and took out a flat-rate loan to repay the balance. Simple interest was charged at a rate of 7% per annum on the amount borrowed. She repaid the loan over 2 years, making equal weekly repayments. **3**

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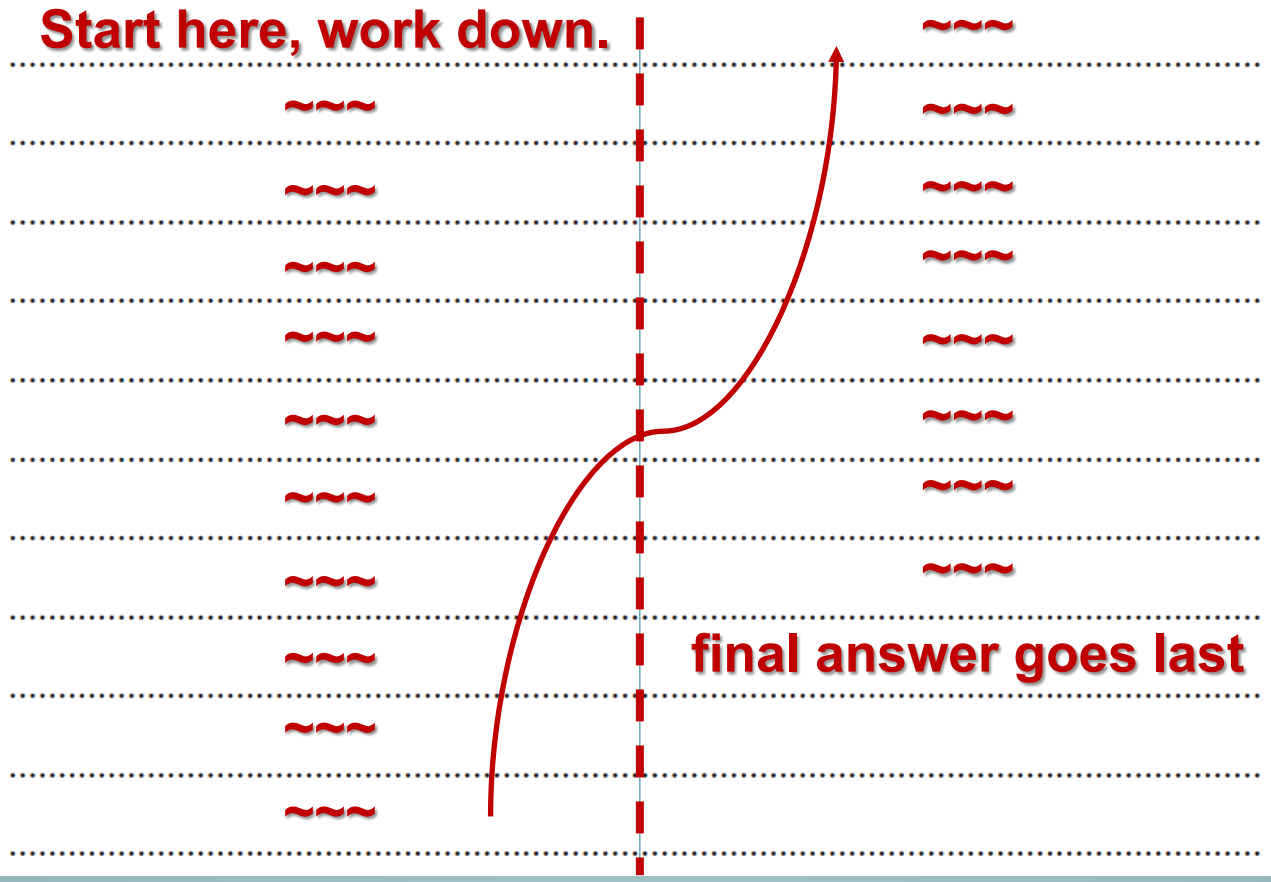

Using the writing spaces

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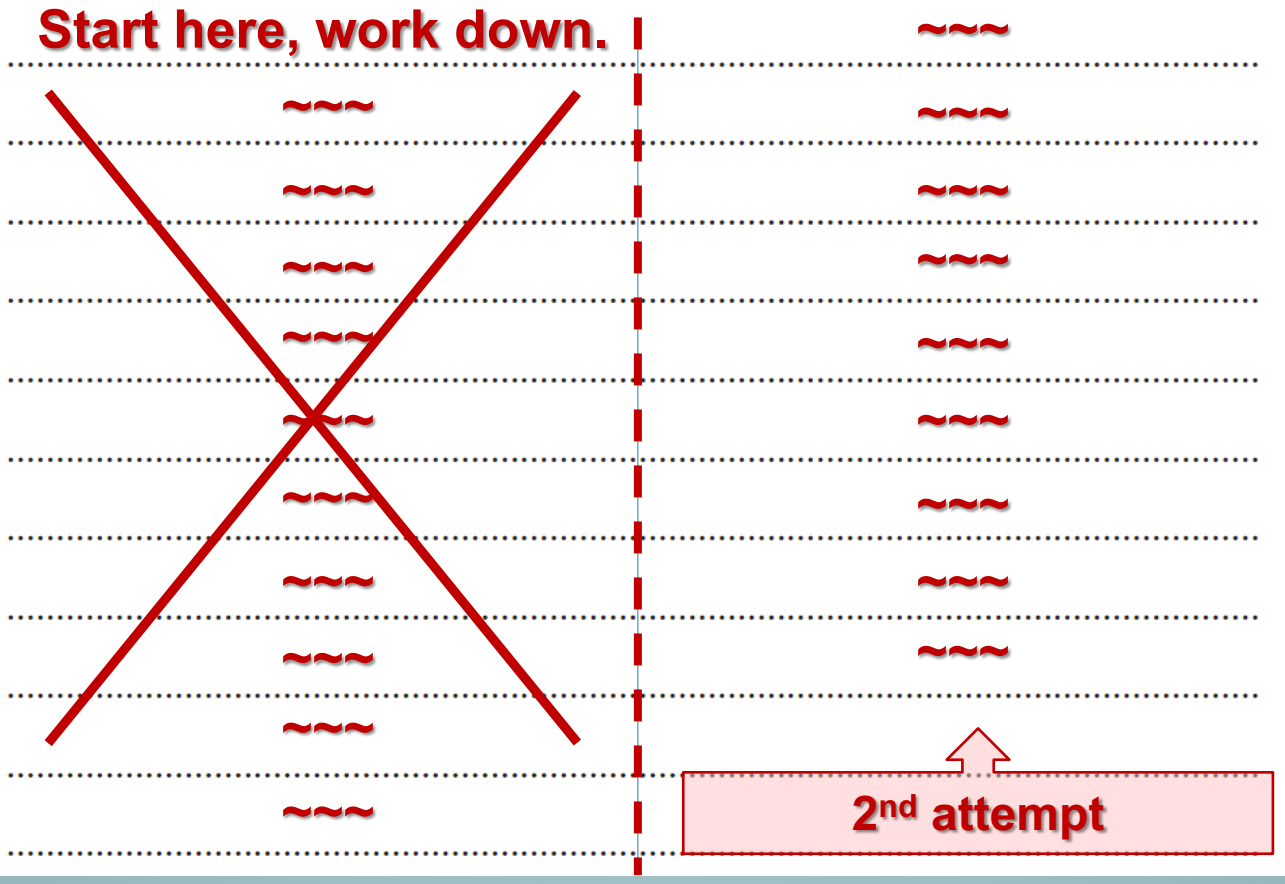

Using the writing spaces

Section II extra writing space

If you use this space, clearly indicate which question you are answering.

28 d (iii)

Using the writing spaces

Use black pen

Write neatly and clearly

Don’t use a hard fine pencil

Don’t use liquid paper

Don’t write too close to the edge of the page

Don’t cross out an answer until you have a better answer.

If you have two solutions for a question, cross one out

If you do cross out an answer, make sure it is still readable.

Underline key words and info

Question 26 (continued)

(f) The weight of an object on the moon varies directly with its weight on Earth. An astronaut who weighs 84 kg on Earth weighs only 14 kg on the moon. **2**

A lunar landing craft weighs 2449 kg when on the moon. Calculate the weight of this landing craft when on Earth.

.....

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Underline key words and info

Question 26 (continued)

(f) The weight of an object on the moon varies directly with its weight on Earth. An astronaut who weighs 84 kg on Earth weighs only 14 kg on the moon. **2**

A lunar landing craft weighs 2449 kg when on the moon. Calculate the weight of this landing craft when on Earth.

	Earth	Moon
astronaut	84	14
LLC	?	2449

always double check information copied from the question

Avoid transcription errors

$A = P(1+r)^n$

$A = 20000$

$r = 0 \cdot 03 \div 12 = 0 \cdot 0025$

$n = 15 \times 12 = 180$

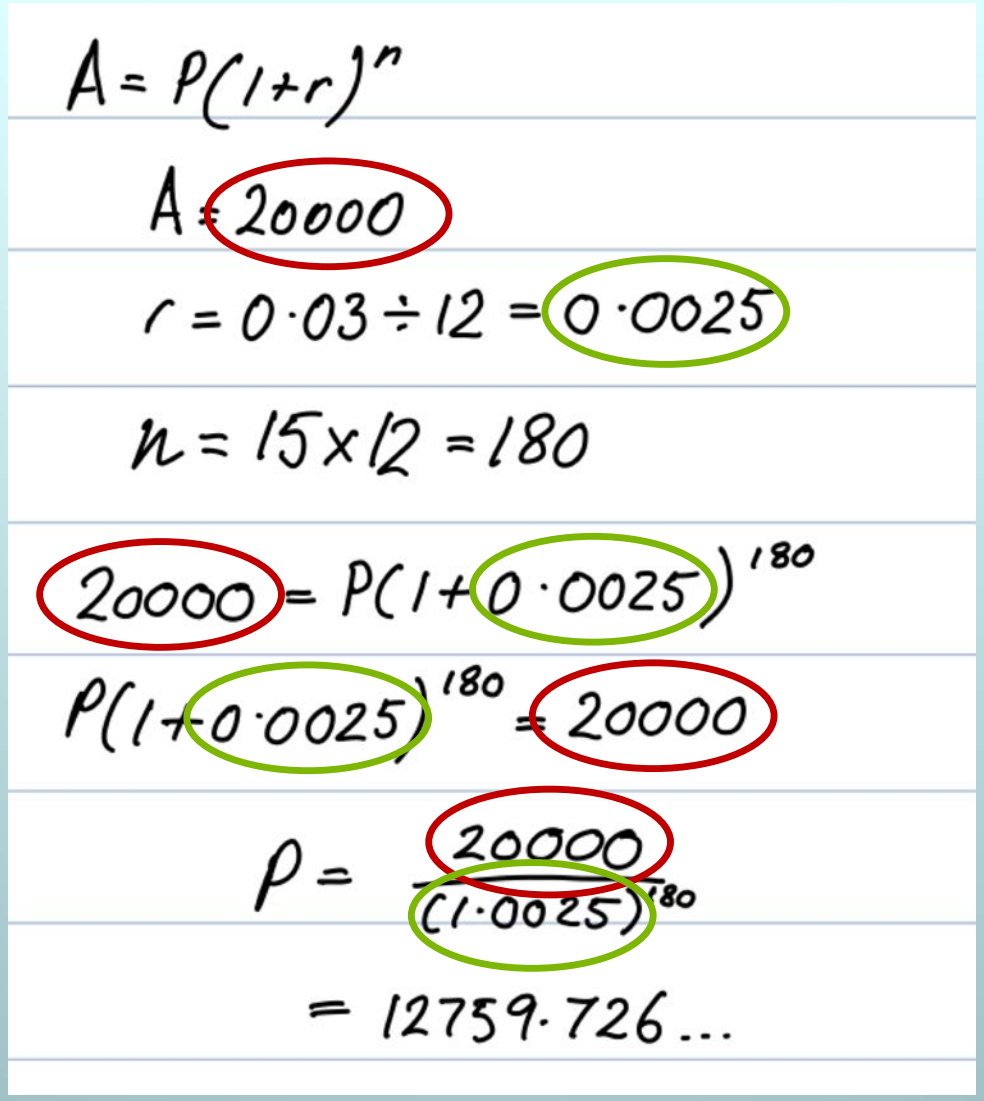
$20000 = P(1+0 \cdot 0025)^{180}$

$P(1+0 \cdot 0025)^{180} = 20000$

$$P = \frac{20000}{(1 \cdot 0025)^{180}}$$

$= 12759 \cdot 726 \ldots$

Avoid transcription errors



Multiple parts

(b) Osaka is at 34°N, 135°E, and Denver is at 40°N, 105°W.

(i) Show that there is a 16-hour time difference between the two cities. (Ignore time zones.) **2**

(ii) John lives in Denver and wants to ring a friend in Osaka. In Denver it is 9 pm Monday. **1**

What time and day is it in Osaka then?

(iii) John's friend in Osaka sent him a text message which happened to take 14 hours to reach him. It was sent at 10 am Thursday, Osaka time. **2**

What was the time and day in Denver when John received the text?

Multiple parts

(b) Osaka is at 34°N, 135°E, and Denver is at 40°N, 105°W.

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What was the time and day in Denver when John received the text?

Read all the parts of the question before you start part (i)

Highlight and underline key words and information.

Try all the parts.

Can information given in part (i) allow you to start the next part?

Tables

When given tables, use it, not a formula.

Question 27 (continued)

(c) A table of future value interest factors for an annuity of $1 is shown.

Table of future value interest factors					
Period	*Interest rate per period*				
	1%	2%	3%	4%	5%
3	3.0301	3.0604	3.0909	3.1216	3.1525
4	4.0604	4.1216	4.1836	4.2465	4.3101
5	5.1010	5.2040	5.3091	5.4163	5.5256
6	6.1520	6.3081	6.4684	6.6330	6.8019

An annuity involves contributions of $12 000 per annum for 5 years. The interest rate is 4% per annum, compounded annually.

(i) Calculate the future value of this annuity. **1**

.....

.....

(ii) Calculate the interest earned on this annuity. **1**

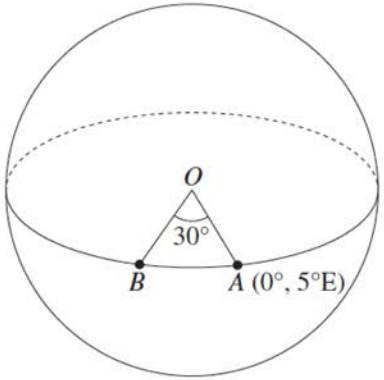
.....

.....

Marks

Question 27 (continued)

(d) Island A and island B are both on the equator. Island B is west of island A. The longitude of island A is 5°E and the angle at the centre of Earth (O), between A and B, is 30°.



NOT TO SCALE

(i) What is the longitude of island B? **1**

.....

.....

(ii) What time is it on island B when it is 10 am on island A? **1**

.....

.....

(iii) A ship leaves island A and travels west along the equator to island B. It travels at a constant speed of 40 km/h. **3**

How long will the ship take to arrive at island B? Give your answer in days and hours to the nearest hour.

.....

.....

.....

When you think you have answered a question:

Stop

Look

Think

Have I really answered the question?

Have I really answered the question?

9 Lynne invests $1000 for a term of 15 months. Interest is paid at a flat rate of 3.75% per annum.

How much will Lynne's investment be worth at the end of the term?

Have I really answered the question?

(b) What is the maximum number of standard drinks that a male weighing 84 kg can consume over 4 hours in order to maintain a blood alcohol content (BAC) of less than 0.05? **3**

Have I really answered the question?

(b) What is the maximum number of standard drinks that a male weighing 84 kg can consume over 4 hours in order to maintain a blood alcohol content (BAC) of less than 0.05? **3**

$$BAC_{male} = \frac{10N - 7.5H}{6.8M}$$

$$0.05 = \frac{10N - 7.5H}{6.8M}$$

$$\frac{10N - 7.5 \times 4}{571.2} = 0.05$$

$$10N - 30 = 28.56$$

$$10N = 58.56$$

$$N = 5.856$$

Have I really answered the question?

(b) What is the maximum number of standard drinks that a male weighing 84 kg can consume over 4 hours in order to maintain a blood alcohol content (BAC) of less than 0.05? **3**

$$BAC_{male} = \frac{10N - 7.5H}{6.8M}$$

$$0.05 = \frac{10N - 7.5H}{6.8M}$$

$$\frac{10N - 7.5 \times 4}{571.2} = 0.05$$

$$10N - 30 = 28.56$$

$$10N = 58.56$$

$$N = 5.856$$

Therefore, the maximum whole number of standard drinks that can be consumed is 5. The 6th drink, if consumer completely, will put his BAC over.

In this question, the calculation and answer is not enough. Use words to make a concluding statement.

Is my answer expressed correctly?

What is the value of θ, to the nearest minute?

208.345 correct to two significant figures?

How much deeper should one
Answer to the nearest mm.

correlation coefficient, us
t to three decimal places.

ol A, to the nearest degree.

r, to the nearest kilogram, th

When you think you have answered a question:

Stop

Look

Think

Have I done everything I was asked to do?

Have I done everything?

(b) Osaka is at 34°N, 135°E, and Denver is at 40°N, 105°W.

(i) Show that there is a 16-hour time difference between the two cities. (Ignore time zones.) **2**

(ii) John lives in Denver and wants to ring a friend in Osaka. In Denver it is 9 pm Monday. **1**

What time and day is it in Osaka then?

(iii) John's friend in Osaka sent him a text message which happened to take 14 hours to reach him. It was sent at 10 am Thursday, Osaka time. **2**

What was the time and day in Denver when John received the text?

When you think you have answered a question:

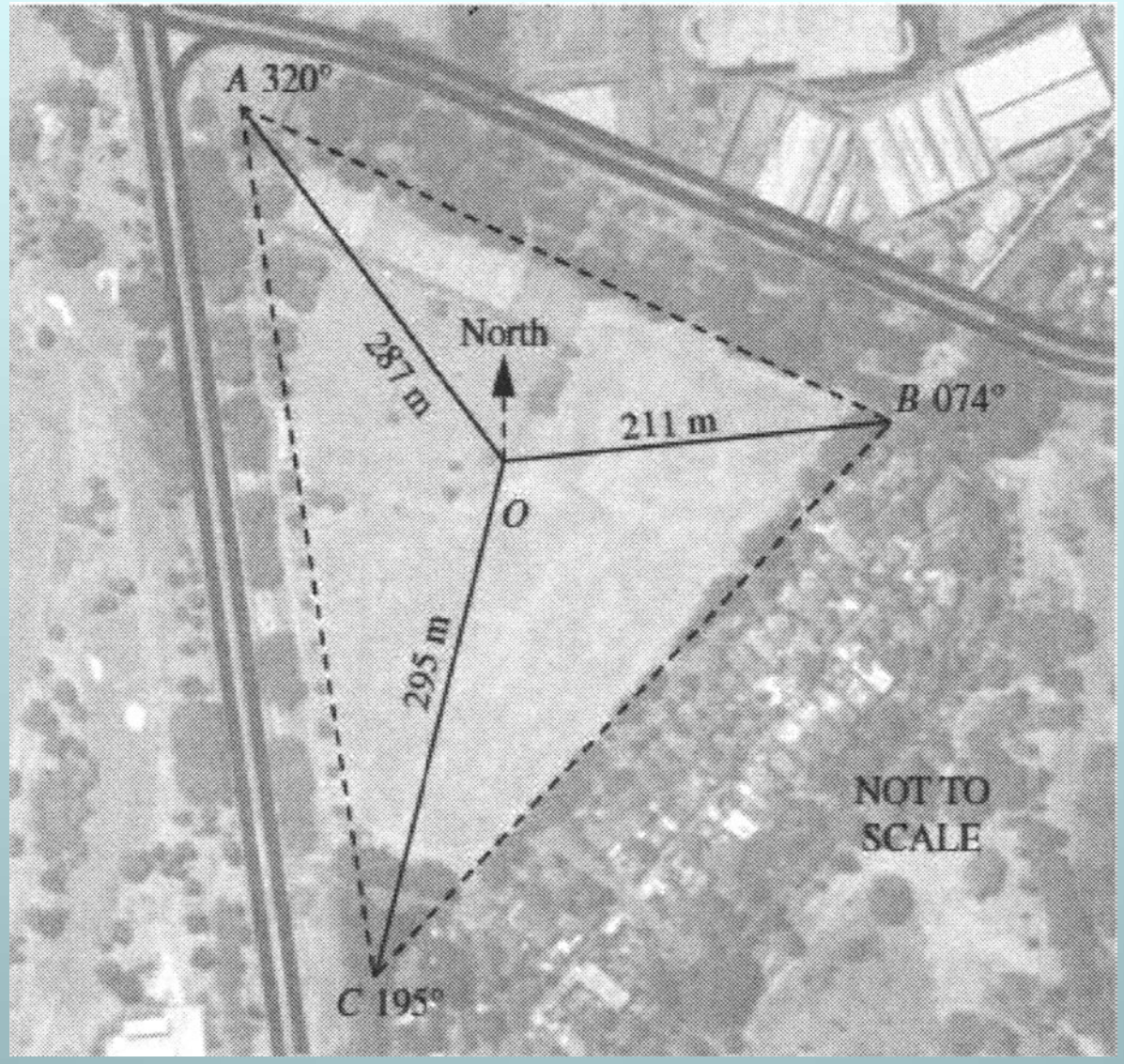
Stop

Look

Think

Does my answer make sense?

Is it reasonable?


A 320°
North
287 m
B 074°
211 m
O
295 m
NOT TO
SCALE
C 195°

Does my answer make sense? Is it reasonable?

Question 30 (15 marks)

(a) Chandra and Sascha plan to have $20 000 in an investment account in 15 years time for their grandchild's university fees. **3**

The interest rate for the investment account will be fixed at 3% per annum compounded monthly.

Calculate the amount that they will need to deposit into the account now in order to achieve their plan.

Is it reasonable?
Can I check?

(a) Expand $4x\left(7x^4 - x^2\right)$. **1**

(c) Solve the equation $\frac{5x+1}{3} - 4 = 5 - 7x$. **3**

(d) Solve these simultaneous equations to find the values of x and y. **3**

$$y = 2x + 1$$
$$x - 2y - 4 = 0$$

Algebra – expressions vs equations

Expressions can be:

simplified, factorised, expanded

Numbers can be **substituted** into expressions.

Question:

Simplify $5-2(x+7)$

Equation can be solved to give solutions.

Question:

Solve $5-2(x+7)=0$

Algebra – expressions vs equations

Expressions can be:

simplified, factorised, expanded

Numbers can be **substituted** into expressions.

Question:

Simplify $5-2(x+7)$

$$=5-2x-14$$

$$=-9-2x$$

Equation can be solved to give solutions.

Question:

Solve $5-2(x+7)=0$

$$5-2x-14=0$$

$$-9-2x=0$$

$$-9=2x$$

$$2x=-9$$

$$x=-4.5$$

Questions in which the answer is given.

(i) Show that the size of angle AOB is $114°$. **1**

This is the last thing to write down, not the first!
This is the answer.
You need to convince the marker that you would have achieved this answer, even if it were not given to you.
For 2 marks, at least two lines.

(v) Using the values from the table in part (iv), show that the equation of the least-squares line of best fit is **2**

$$y = 1.29x + 49.9.$$

Multi-part questions in which the answer is **NOT** given.

(i) Show that the size of angle AOB is 114°. **1**

(i) Find the size of angle AOB.

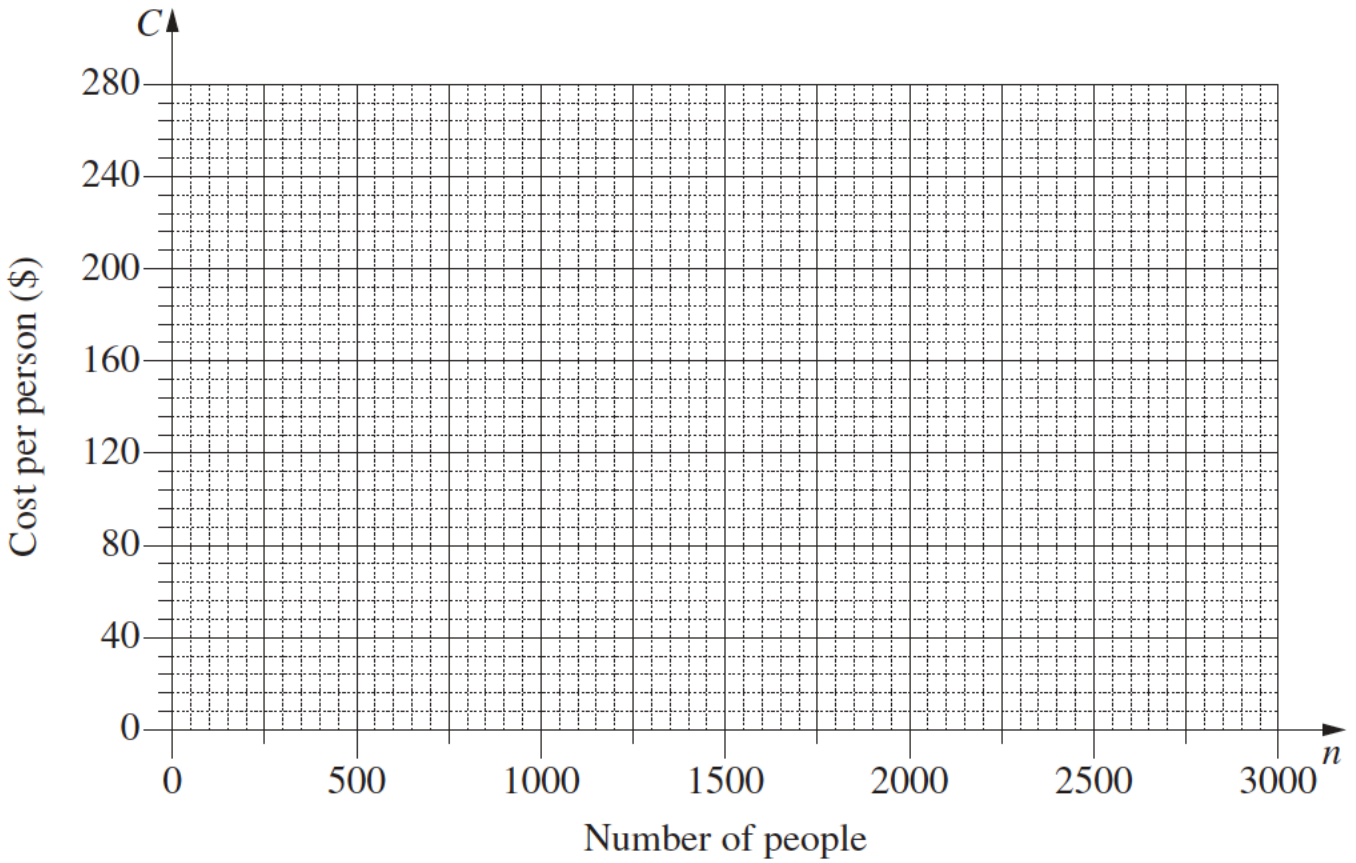
Decide on a reasonable value.
Write it down in part (i).
Use that value in part (ii)

Questions in which a diagram is given.

- Write useful information on the diagram.
- You can add extra letters to the diagram.
- Write answers to part (i), (ii) on the diagram as you go.
- Write final answers in the working space, don't leave them on the diagram.
- If there is something in the diagram that you use in the questions, you can mark it like *.

Diagrams… **use a ruler!**

(ii) Using the values from the table, draw the graph showing the relationship between n and C. **2**



a clear plastic ruler

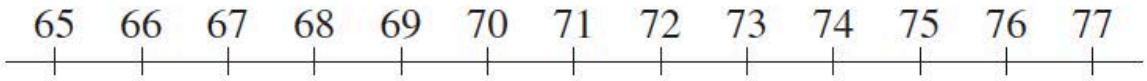
Diagrams… **use a ruler … please!**

(c) Terry and Kim each sat twenty class tests. Terry's results on the tests are displayed in the box-and-whisker plot shown in part (i).

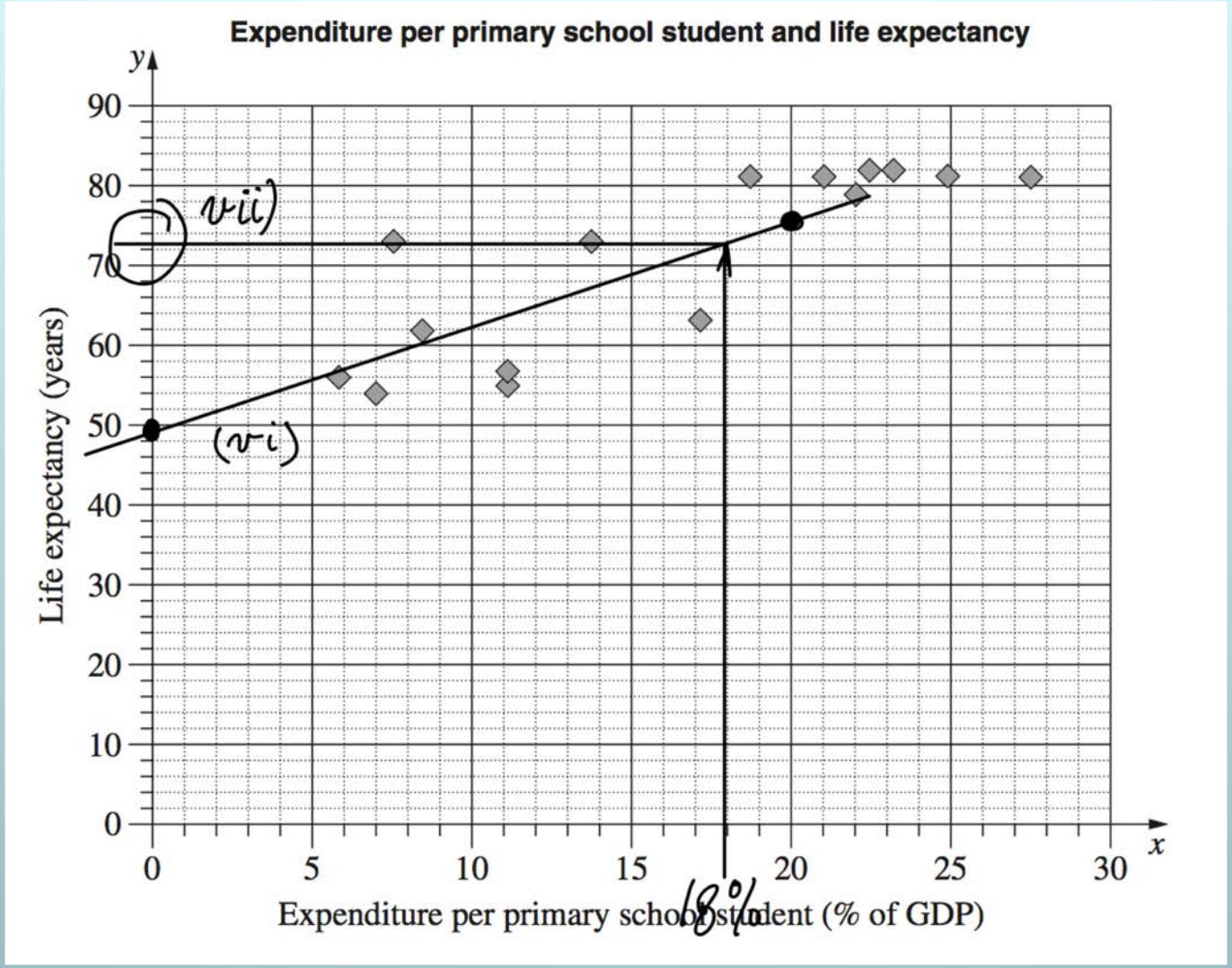
(i) Kim's 5-number summary for the tests is 67, 69, 71, 73, 75. **1**

Draw a box-and-whisker plot to display Kim's results below that of Terry's results.

Kim



Diagrams... **use a ruler … pretty please!**

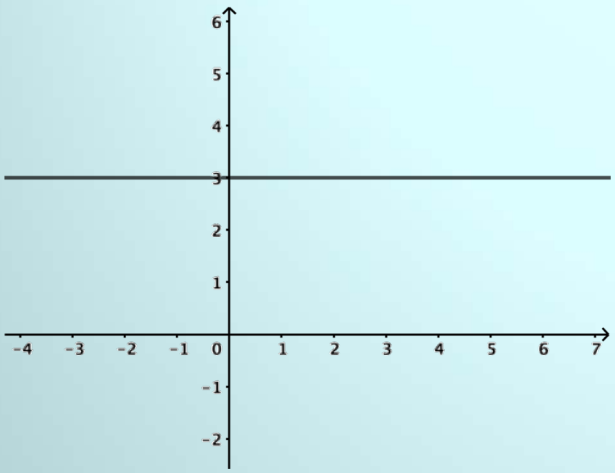


Diagrams… pen or pencil?

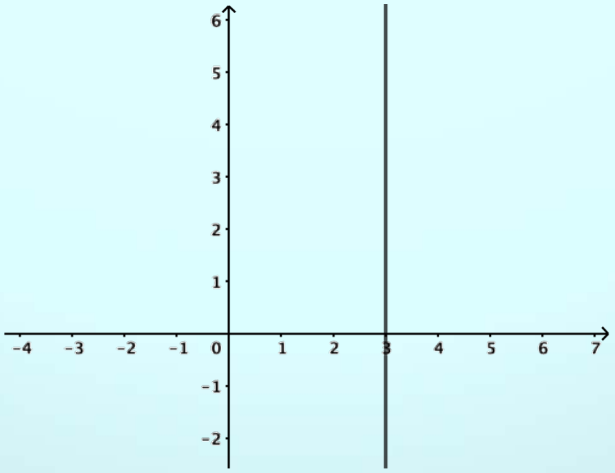
Draw with a pencil.

Rub out if necessary.

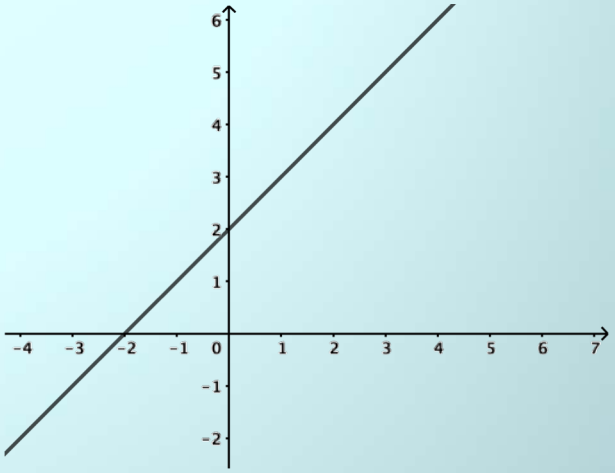
Go over it with a black pen.



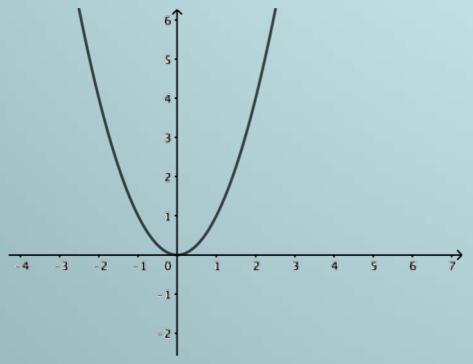
horizontal line
for example, $y = 3$



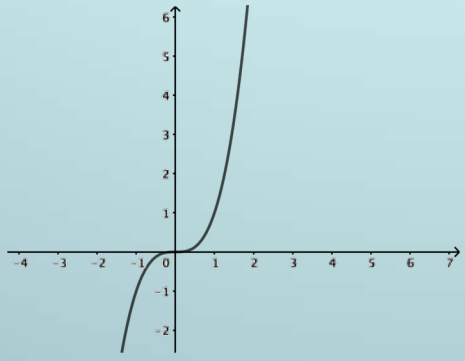
vertical line
for example, $x = 3$



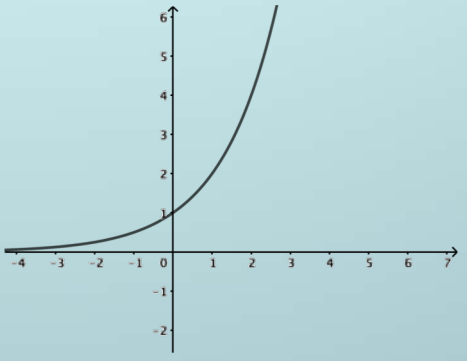
straight line
for example, $y = x + 2$



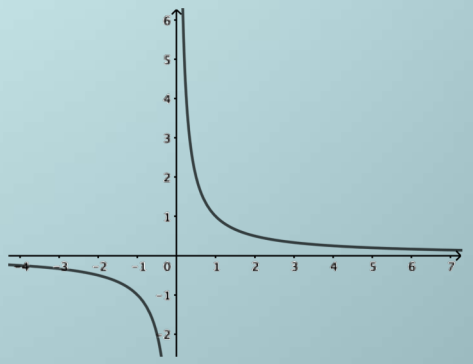
parabola
for example, $y = x^2$



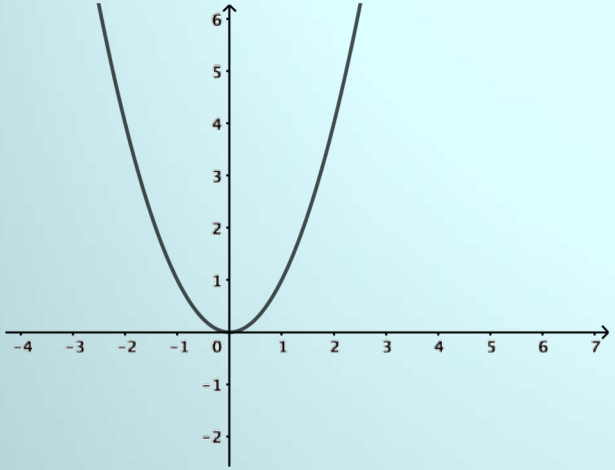
cubic
for example, $y = x^3$



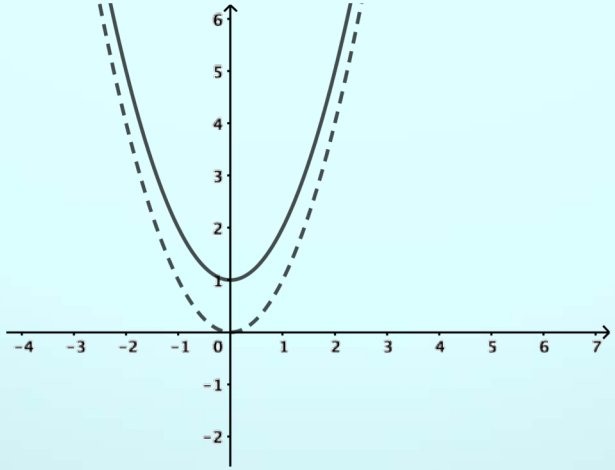
exponential
for example, $y = 2^x$



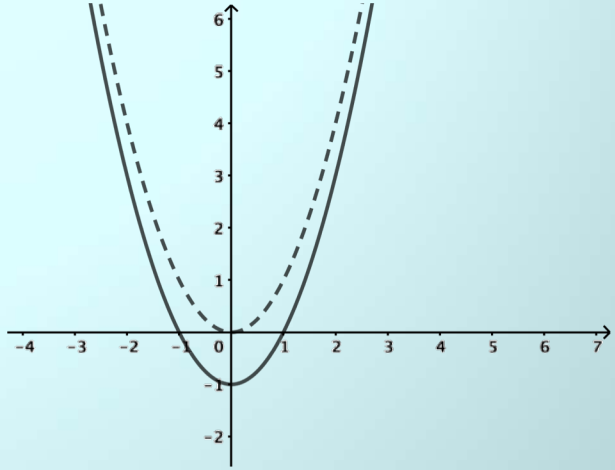
hyperbola
for example, $y = \frac{1}{x}$



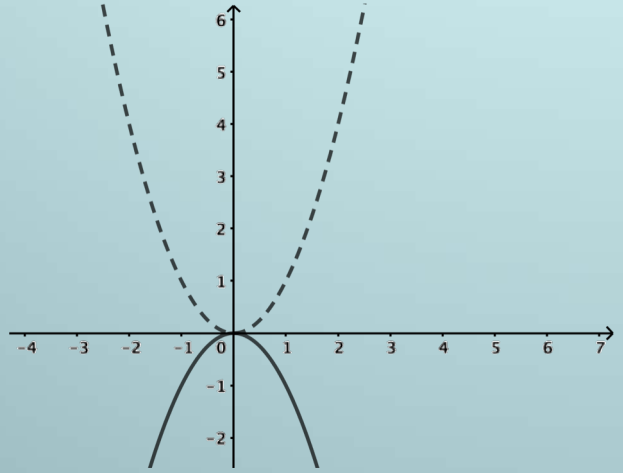
parabola
$y = x^2$



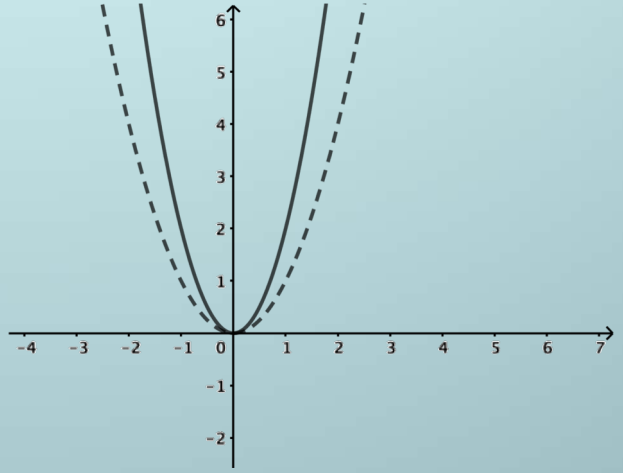
parabola
$y = x^2 + 1$



parabola
$y = x^2 - 1$



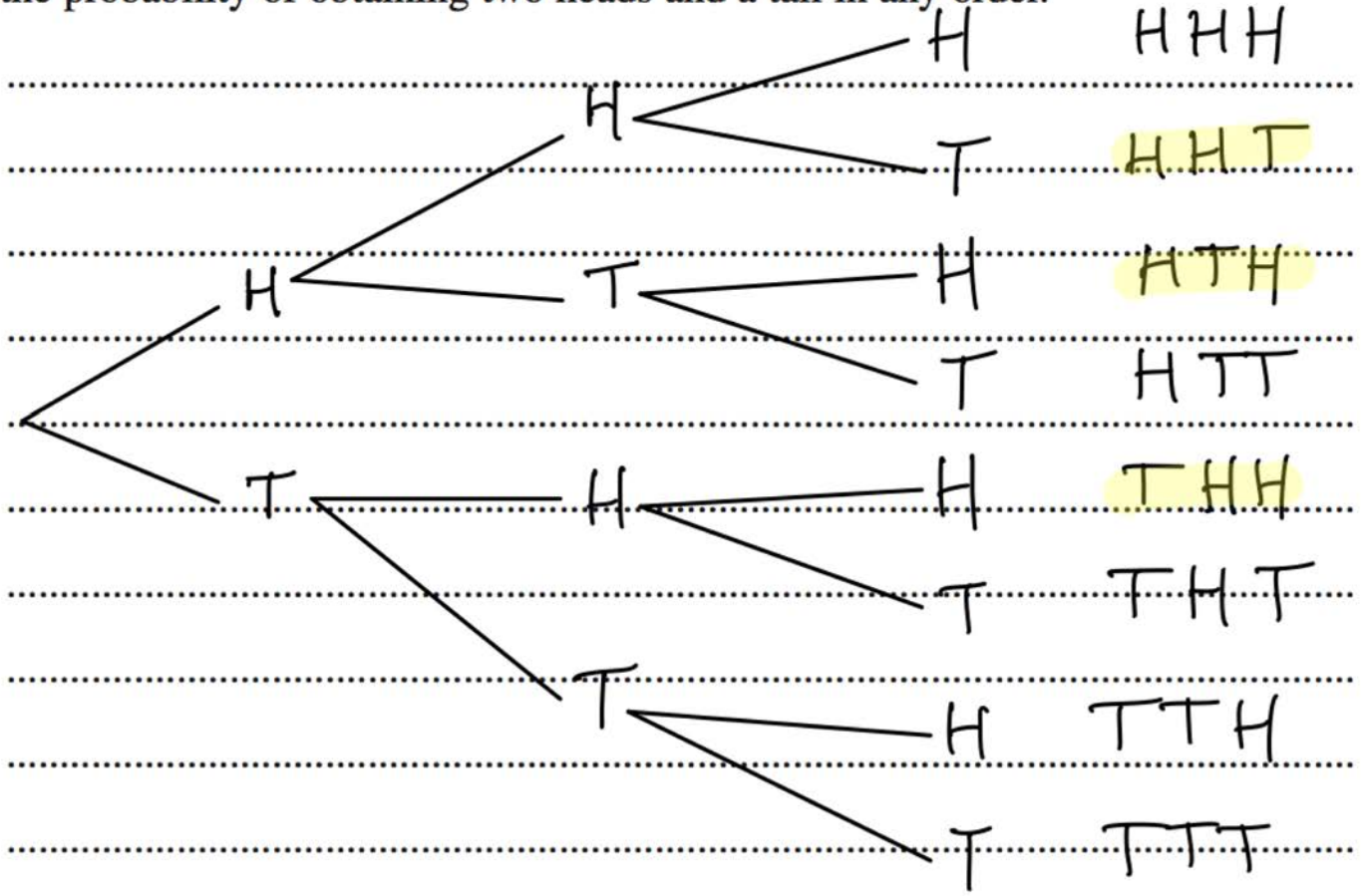
parabola
$y = -x^2$



parabola
$y = 2x^2$

Tree diagrams

(c) A fair coin is tossed three times. Using a tree diagram, or otherwise, calculate the probability of obtaining two heads and a tail in any order. **2**



Questions that say:

Why is …

Show that …

Prove that …

Explain why …

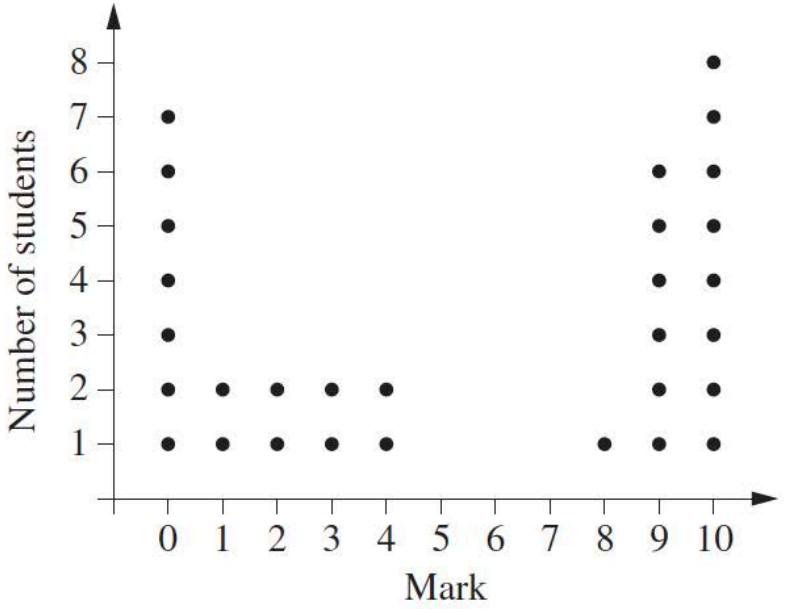
Justify your answer …

Compare and contrast …

What does this indicate …

(d) All the students in a class of 30 did a test.

The marks, out of 10, are shown in the dot plot.



(iii) A student states that for any data set, 68% of the scores should lie within one standard deviation of the mean. **1**

With reference to the dot plot, explain why the student's statement is NOT relevant in this context.

.....

.....

(e) Jay bought a computer for $3600. His friend Julie said that all computers are worth nothing (i.e. the value is $0) after 3 years.

(i) Find the amount that the computer would depreciate each year to be worth nothing after 3 years, if the straight line method of depreciation is used. **1**

(ii) Explain why the computer would never be worth nothing if the declining balance method of depreciation is used, with 30% per annum rate of depreciation. Use suitable calculations to support your answer. **2**

(iii) Terry claims that his results were better than Kim's. Is he correct? Justify your answer by referring to the summary statistics and the skewness of the distributions. **4**

(iii) Terry claims that his results were better than Kim's. Is he correct? Justify your answer by referring to the summary statistics and the skewness of the distributions. **4**

You could provide evidence to argue that:

- Terry is correct

  or

- Terry is incorrect

  or

- There is not enough information for Terry to be sure

Don't contradict yourself.

Communicate clearly

Correct answers are important, but sometimes:

The HSC markers want to see more than just the correct answer, especially for 2, 3 or 4 marks.

Show every step of working and every calculation, so that the markers can see what you were thinking and what you were doing in your head and on your calculator.

http://gomaths.net/4992