Variation

Direct

$y \propto x$: $y = kx$. Graph of y against x is a straight line through O.

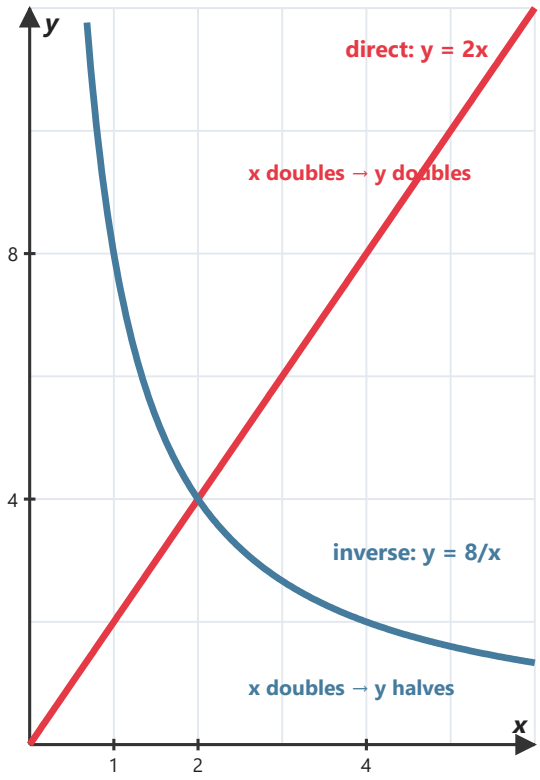
Inverse

$y \propto 1/x$: $y = k/x$. As x increases, y decreases.

2 Powers

$y \propto x^2$, $y \propto \sqrt{x}$, $y \propto 1/x^2$: write the power exactly.

Direct vs inverse variation



Joint

$y \propto xz$: $y = kxz$ (varies as the product of two variables).

Combined

$y \propto x/z$: $y = kx/z$ (direct with one, inverse with the other).

Method

1. Write the equation with k. 2. Put in values to find k. 3. Use it.

FORMULA / KEY TERMS

- $y \propto x \Rightarrow y = kx$
- $y \propto 1/x \Rightarrow y = k/x$
- $y \propto x^2z \Rightarrow y = kx^2z$
- $y \propto x/\sqrt{z} \Rightarrow y = kx/\sqrt{z}$

COMMON MISTAKE

❌ "$y \propto x^2$ and $x = 3$ gives $k = y \div 3$."

✅ Square first: $k = y \div x^2 = y \div 9$.

QUICK CHECK (worked answers at the back, page 22)

1. $y \propto x^2$ and $y = 18$ when $x = 3$. Find y when $x = 5$.
2. y varies inversely as x and $y = 4$ when $x = 6$. Find x when $y = 8$.
3. $P \propto Q/\sqrt{R}$. $P = 6$ when $Q = 3$ and $R = 4$. Find P when $Q = 5$ and $R = 25$.

Matrices

Order

rows × columns. A 2 × 3 matrix has 2 rows, 3 columns.

Add / subtract

Only same order; add matching elements.

Scalar

kA: multiply EVERY element by k.

Multiplying matrices: row × column

$$\begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} 1 \\ 2 \end{bmatrix} = \begin{bmatrix} 4 \\ 11 \end{bmatrix}$$

top: 2(1) + 1(2) = 4 bottom: 3(1) + 4(2) = 11

(2 × 2) × (2 × 1) → (2 × 1)

inner numbers must match; outer give the answer's order

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \quad A^{-1} = \frac{1}{ad - bc}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

swap a and d · change the signs of b and c
ad − bc = 0 → NO inverse
$AI = IA = A$ $AA^{-1} = A^{-1}A = I$

Multiply

AB exists only if columns of A = rows of B. Usually AB ≠ BA.

Identity I

$I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$: AI = IA = A.

Simultaneous equations

Write as a matrix equation and multiply by the inverse.

FORMULA / KEY TERMS

- Determinant |A| = ad − bc
- $A^{-1} = 1/(ad - bc) \times \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$
- No inverse when ad − bc = 0
- (m × n)(n × p) → (m × p)

COMMON MISTAKE

❌ "Inverse: swap b and c."

✅ SWAP a and d; change the SIGNS of b and c; then divide by ad − bc.

QUICK CHECK (worked answers at the back, page 22)

1. Find $\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix} \times \begin{pmatrix} 1 \\ 2 \end{pmatrix}$.
2. Find the inverse of $\begin{pmatrix} 3 & 2 \\ 4 & 3 \end{pmatrix}$.
3. Use matrices to solve 3x + 2y = 7 and 4x + 3y = 10.

Consumer Mathematics: Taxation

Why tax?

Pays for schools, hospitals, roads, security and public services.

Chargeable income

Annual income − tax exemptions − tax reliefs.

Tax rebate

Taken off the tax AFTER it is calculated (e.g. zakat paid).

Tax	Paid on	Collected by
Income tax	yearly chargeable income	LHDN (IRB)
Sales tax	certain goods	customs (JKDM)
Service tax	certain services (hotels, phone...)	customs (JKDM)
Road tax	motor vehicles	JPJ
Assessment tax (cukai pintu)	houses/buildings	local council
Quit rent (cukai tanah)	land	state land office

MTD / PCB

Monthly tax deduction taken from salary by the employer.

Late = penalty

Late filing or payment brings fines/penalties.

Rates change

Always use the rate table GIVEN in the question.

FORMULA / KEY TERMS

- Chargeable income = income − exemptions − reliefs
- Tax = tax on first part + rate × remaining
- Tax payable = tax − rebates − MTD paid
- Service/sales tax = rate × price

COMMON MISTAKE

❌ "Tax reliefs are taken away from the tax payable."

✅ Reliefs reduce the INCOME first. Rebates reduce the TAX afterwards.

QUICK CHECK (worked answers at the back, page 22)

1. Chargeable income RM48 000. Tax on the first RM35 000 is RM600 and the rest is taxed at 6%. Find the income tax.
2. A hotel bill is RM200 before an 8% service tax. Find the total.
3. Annual value of a house is RM12 000; assessment rate 5%. Find the yearly assessment tax.

Ratios and Graphs of Trigonometric Functions

Quadrants

I: all +; II: sin +; III: tan +; IV: cos + ("All Students Take Coffee").

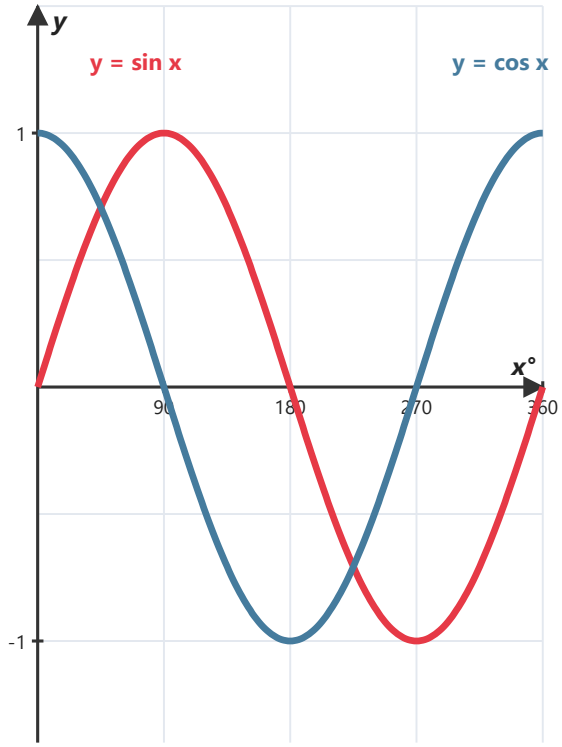
Reference angle

Acute angle to the x-axis: 180° − θ, θ − 180°, 360° − θ.

sin and cos

Between −1 and 1, period 360°. cos starts at 1, sin at 0.

Graphs of sin x and cos x



tan

Period 180°; no value at 90° and 270°.

y = a sin bx + c

a = amplitude, b = cycles in 360°, c moves the graph up/down.

Solving

Find the reference angle, then use the quadrants for all answers.

FORMULA / KEY TERMS

- tan θ = sin θ ÷ cos θ
- sin(180° − θ) = sin θ; cos(180° − θ) = −cos θ
- Amplitude of y = a sin bx is |a|
- Period of y = sin bx is 360° ÷ b

COMMON MISTAKE

❌ "sin x = 0.5 means x = 30° only."

✅ In 0° ≤ x ≤ 360°, sin is also positive in quadrant II: x = 30° and 150°.

QUICK CHECK (worked answers at the back, page 22)

1. Find sin 210° without a calculator.
2. Solve sin x = 0.5 for 0° ≤ x ≤ 360°.
3. State the amplitude and period of y = 3 cos 2x.

Measures of Dispersion for Grouped Data

Class interval

e.g. 20–29. Midpoint = (20 + 29) ÷ 2 = 24.5.

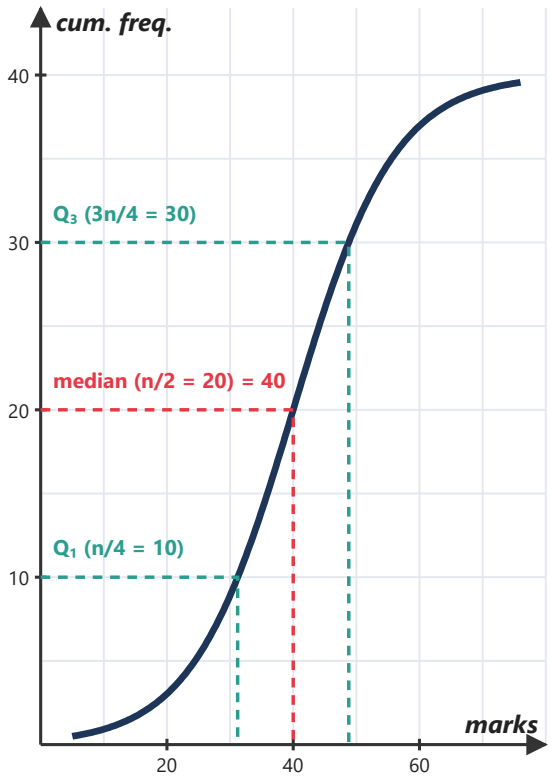
Boundaries

Lower 19.5, upper 29.5. Size = 10.

Histogram

Bars at the boundaries, no gaps. Frequency polygon joins the midpoints.

Ogive, n = 40 (plot at UPPER boundaries)



Ogive

Cumulative frequency at each UPPER boundary; start at zero.

From the ogive

Median at n/2, Q_1 at n/4, Q_3 at 3n/4; percentiles likewise.

Mean and σ

Use midpoints x with the frequencies f.

FORMULA / KEY TERMS

- $\bar{x} = \Sigma fx \div \Sigma f$
- $\sigma^2 = \Sigma fx^2 \div \Sigma f - \bar{x}^2$
- IQR = $Q_3 - Q_1$
- kth percentile at (k/100) × n

COMMON MISTAKE

❌ "Plot the ogive at the class midpoints."

✅ Plot cumulative frequency against the UPPER BOUNDARY (e.g. 29.5).

QUICK CHECK (worked answers at the back, page 22)

1. Classes 10–19 (f = 4), 20–29 (f = 6), 30–39 (f = 10). Find the mean.
2. Find the standard deviation for question 1.
3. State the upper boundary of the class 20–29.

Worked Answers (2/2)

Form 4 Chapter 10: Consumer Mathematics: Financial Management

1. 3500 − (1800 + 1200) = RM500 (surplus).
2. 6000 ÷ 24 = RM250 a month.
3. No: it is not specific (which car, how much) and has no time frame.

Form 5 Chapter 1: Variation

1. $y = kx^2 \rightarrow 18 = 9k \rightarrow k = 2$. $y = 2 \times 25 = 50$.
2. $y = k/x \rightarrow k = 4 \times 6 = 24$. $8 = 24/x \rightarrow x = 3$.
3. $P = kQ/\sqrt{R} \rightarrow 6 = 3k/2 \rightarrow k = 4$. $P = 4 \times 5 \div 5 = 4$.

Form 5 Chapter 2: Matrices

1. $\begin{pmatrix} 2(1) + 1(2) \\ 3(1) + 4(2) \end{pmatrix} = \begin{pmatrix} 4 \\ 11 \end{pmatrix}$.
2. $ad - bc = 3(3) - 2(4) = 9 - 8 = 1$. Inverse $= \begin{pmatrix} 3 & -2 \\ -4 & 3 \end{pmatrix}$.
3. $\begin{pmatrix} 3 & 2 \\ 4 & 3 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 7 \\ 10 \end{pmatrix} \rightarrow \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 & -2 \\ -4 & 3 \end{pmatrix}\begin{pmatrix} 7 \\ 10 \end{pmatrix} = \begin{pmatrix} 21 - 20 \\ -28 + 30 \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$. $x = 1$, $y = 2$.

Form 5 Chapter 3: Consumer Mathematics: Insurance

1. Required = 80% × 400 000 = 320 000. Compensation = (240 000 ÷ 320 000) × 20 000 − 1000 = 15 000 − 1000 = RM14 000.
2. After deductible: 5500 − 500 = 5000. Patient's 20% = 1000. Total paid = 500 + 1000 = RM1500.
3. Comprehensive policy.

Form 5 Chapter 4: Consumer Mathematics: Taxation

1. Rest = 48 000 − 35 000 = 13 000. 6% × 13 000 = 780. Tax = 600 + 780 = RM1380.
2. 8% × 200 = 16. Total = RM216.
3. 5% × 12 000 = RM600 a year (paid as 2 × RM300).

Form 5 Chapter 5: Congruency, Enlargement and Combined Transformations

1. $5 \times 3^2 = 45\ cm^2$.
2. $k^2 = 72 \div 8 = 9 \rightarrow |k| = 3$.
3. Apply Q to A first, then apply P to the image.

Form 5 Chapter 6: Ratios and Graphs of Trigonometric Functions

1. 210° is in quadrant III (sin −); reference angle 30°. sin 210° = −sin 30° = −0.5.
2. $x = 30°$ and $180° - 30° = 150°$.
3. Amplitude 3; period 360° ÷ 2 = 180°.

Form 5 Chapter 7: Measures of Dispersion for Grouped Data

1. Midpoints 14.5, 24.5, 34.5. $\Sigma fx = 58 + 147 + 345 = 550$; $\Sigma f = 20$. $\bar{x} = 27.5$.
2. $\Sigma fx^2 = 4(210.25) + 6(600.25) + 10(1190.25) = 16\ 345$. $\sigma^2 = 16\ 345 \div 20 - 27.5^2 = 817.25 - 756.25 = 61$. $\sigma = \sqrt{61} = 7.81$.
3. 29.5

Form 5 Chapter 8: Mathematical Modeling

1. $C = 30 + 0.10m$. $C = 30 + 0.10(250) = RM55$.
2. $P = 500(2)^t$. $P = 500 \times 16 = 8000$.
3. $t = -6 \div (2 \times -1) = 3$ s. $h = -9 + 18 = 9$ m.

Key Terms: English – Bahasa Melayu (2/2)

Form 5. Use the English words in your DLP answers; the BM words help when you read BM books or past papers.

English	Bahasa Melayu
variation	ubahan
direct variation	ubahan langsung
inverse variation	ubahan songsang
joint variation	ubahan bergabung
combined variation	ubahan tergabung
constant	pemalar
matrix	matriks
order	peringkat
element	unsur
identity matrix	matriks identiti
inverse matrix	matriks songsang
determinant	penentu
insurance	insurans
premium	premium
policy	polisi
policyholder	pemegang polisi
deductible	deduktibel
co-insurance	ko-insurans
claim	tuntutan
risk	risiko
taxation	percukaian
income tax	cukai pendapatan
chargeable income	pendapatan bercukai
tax relief	pelepasan cukai
tax rebate	rebat cukai
assessment tax	cukai taksiran
quit rent	cukai tanah
road tax	cukai jalan
congruent	kongruen
enlargement	pembesaran
scale factor	faktor skala
transformation	penjelmaan
translation	translasi
reflection	pantulan
rotation	putaran
tessellation	teselasi
trigonometric ratio	nisbah trigonometri
amplitude	amplitud
period	kala
quadrant	sukuan
reference angle	sudut rujukan
class interval	selang kelas
midpoint	titik tengah
upper boundary	sempadan atas
cumulative frequency	kekerapan longgokan
ogive	ogif
histogram	histogram
percentile	persentil
mathematical modeling	pemodelan matematik
assumption	andaian

Suka sampel ini?

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- Nota Tingkatan 4 dan 5 untuk subjek yang dipilih
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