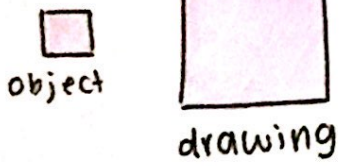
Nota Ringkas MATHS

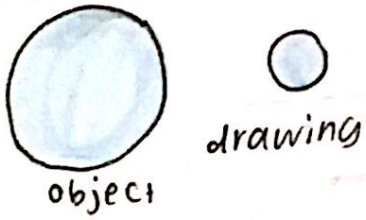
Made by : Nur Farisya Dafyna [SI, 2021]

Scale Drawing

- $n < 1$



- $n > 1$



- scale $= \frac{\text{measurement of scale drawing}}{\text{measurement of object}}$

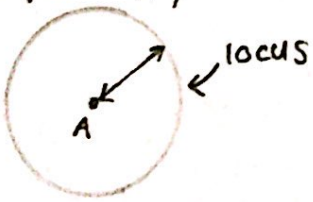
$= \frac{1}{n}$

- scale drawing : object

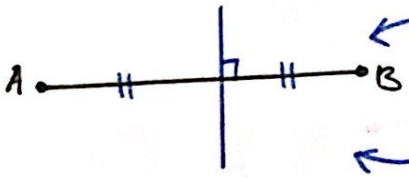
$1 : n$

LOCUS

- point A,



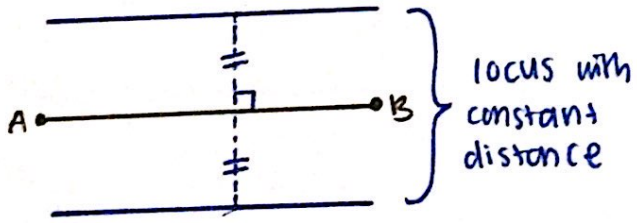
- for line AB,



← perpendicular bisector

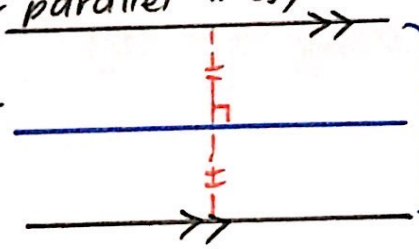
← equidistant from point A and B [equal distance]

- for line AB,



} locus with constant distance

- for parallel lines,



} locus are equi-distant from the parallel lines

POLYGON

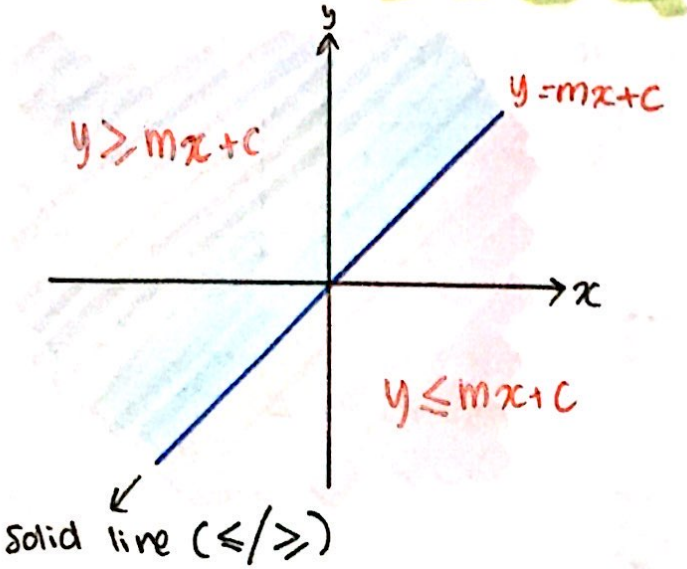
- interior angle

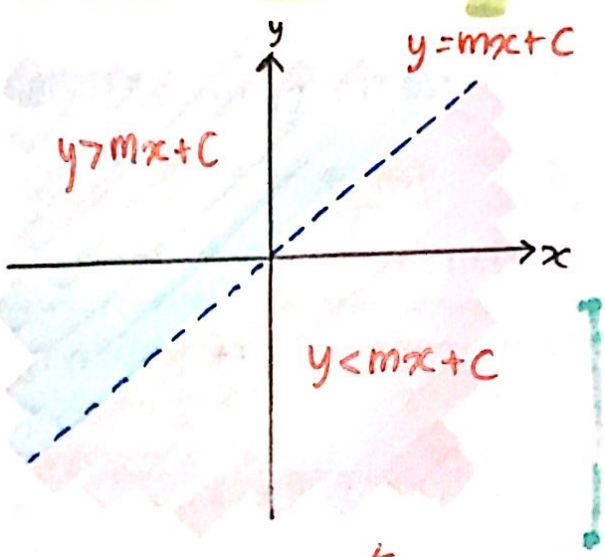
$= \frac{(n-2) \times 180^\circ}{n} = \frac{\text{sum of interior angle}}{n \text{ of sides of polygon}} = 180 - \text{exterior angle}$

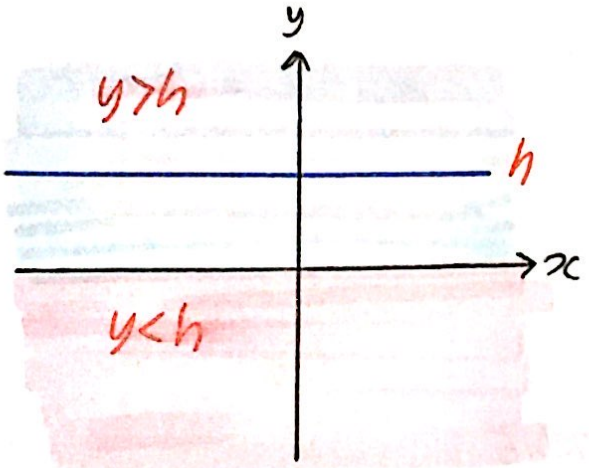
- exterior angle

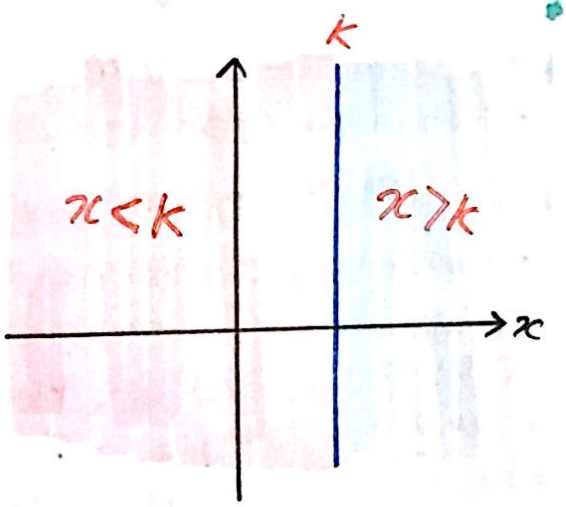
$= \frac{360^\circ}{n} = \frac{\text{sum of exterior angle}}{n \text{ of sides of polygon}}$

LINEAR INEQUALITY









- $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

- common region
  - a region that satisfies all linear inequalities

LOGICAL REASONING

- if P and Q is TRUE,
  - P and Q is TRUE
  - P or Q is TRUE
- P = True, Q = False
  - P and Q is False
  - P or Q is True
- if P and Q is False,
  - P or Q is False
- P = False, Q = True
  - P and Q is False
  - P or Q is true

*if either P or Q is false, P and Q is False but P or Q is true.

if P, then Q

antecedent — consequent

statement	: if p, then q
converse	: if q, then p
inverse	: if ~p, then ~q
contrapositive	: if ~q, then ~p

*~p
- not P or ≠

If P and Q is TRUE / False

- statement / converse / inverse / contrapositive = TRUE

If P = TRUE and Q = False

- converse / Inverse = TRUE
- statement / contrapositive = False

if P = False and Q = TRUE

- converse / Inverse = False
- statement / contrapositive = TRUE

Valid deductive argument [specific conclusion]

	Form 1	Form 2	Form 3
Premise 1	All A are B	if P, then q	if p, then q
Premis 2	C is A	p is true	not q is true
conclusion	C is B	q is true	not p is true

Inductive argument [general conclusion]

- true conclusion
  - strong
    - cogent
      - all premise are true
    - all premise are false
      - not cogent
  - weak
    - not cogent
- False conclusion

~~data handling~~

pie chart

$$\text{Angle} = \frac{\text{quantity}}{\text{total}} \times 360 \quad \text{or} = \frac{\text{percentage}}{100} \times 360$$

stem and leaf

stem	leaf
2	6 8 8
3	1 2 5 5 6
4	5

key : 2|6 means 2.6

or

key : 2|6 mans 26

Measures of central tendencies

mode

- item with the highest frequency

mean

- $\frac{\text{total number}}{n}$

Σ (sigma) = sum

median

- middle
- if theres 2 number of middle,

$$\frac{\text{middle}_1 + \text{middle}_2}{2}$$

range

= biggest value − smallest value

Inter Quotile range

1. arrange the data in ascending order
2. Find median
3. divide to 2 part → before median / → after median
4. group two values after / before median
5. Q_1 is in between group A and group B
6. Q_3 is between group C and D
7. Interquotile range = $Q_1 - Q_3$

1, 4, 4, 6, 8, 10, 13, 15, 16, 20, 22, 23

group C group D

[4 4] 6 [8 10] 13 [15 16] 20 [22 23]

group A group B median

Q_1 Q_3

*tip : group the two first and last value, then group two value after and before median

Inter quotile range = 20 - 16
= 4

2. 11, 14, 14, 17, 19, 20, 20, 21, 22

[11 14] [14 17] 19 [20 20] [21 22]

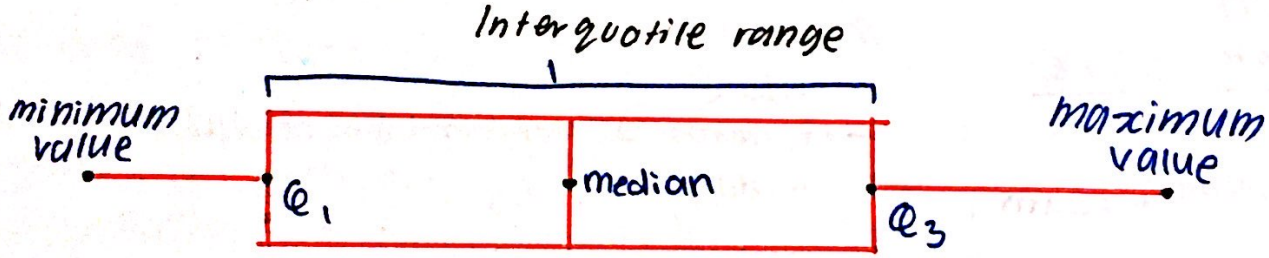
Q_1 median Q_3

*Q_2 = median

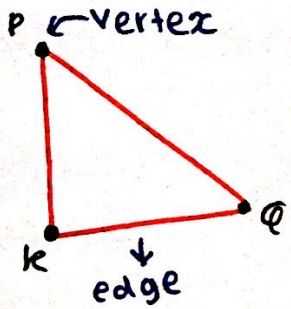
Interquotile range $= \frac{21+20}{2} - \frac{14+14}{2}$

= 6.5

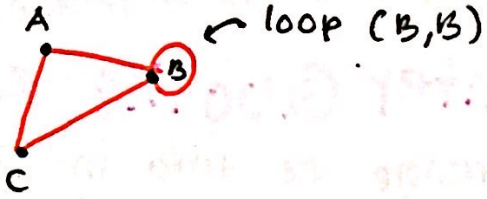
Box Plot



Network



G = graph
V = vertex / dot
e = edge
d = degree
$\sum$ = sum



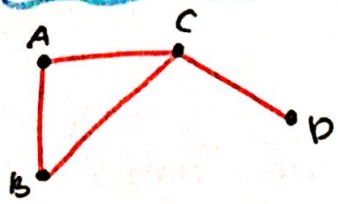
$V = \{v_1, v_2, v_3 \ldots\}$ $E = \{(a_1, b_1), (a_2, b_2) \ldots\}$

eg: $V = \{P, Q, K\}$ eg = $\{(P, Q), (P, K), (K, Q)\}$

$\sum d(v)$ = sum of degree

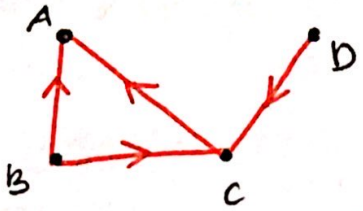
$= 2 \times nE$

undirected graph



- order of vertices written is not important

directed graph



- order of which vertices are written is according to the direction
- # $E = \{(B,A), (B,C), (C,A), (D,C)\}$
  - means that $B \rightarrow A$

TREE

- ↳ no loop / multiple edges
- ↳ all vertices are connected by one edge
- ↳ number of vertices = n
- ↳ number of edges = $n-1$

- degree : A
  - d_{in} =
  - d_{out} =
  - $d(A) = d_{in}(A) + d_{out}(A)$
  - [if there's loop, $d = 1$]

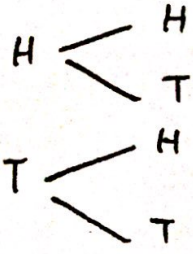
~~probability~~

$n(S) = n(A) \times n(B)$

- $n(S)$: Possible number of outcomes
- $n(A) \times n(B)$: number of outcomes

sample space

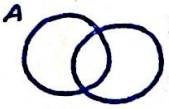
eg: 2 coins are flipped.



sample space $= \{(H,H), (H,T), (T,H), (T,T)\}$

Independant event

- occurance of event A dont affect occurance of event B (and vice versa)
- probability of two independant events (A and B) = product of the probability of both of the events

- multiplication rule of probability:
  $P(A \text{ and } B) = P(A) \times P(B)$
- $P(A \cap B \cap C) = P(A) \times P(B) \times P(C)$
- combined event A and B [mutually exclusive event] occurs if there no intersection between the two events
  $(A \cap B = \emptyset)$
- addition rule of probability
  $P(A \cup B) = P(A) + P(B)$  → mutually exclusive event $(A \cap B = \emptyset)$
  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
   → non-mutually exclusive event
  $(A \cup B = \emptyset)$

$P(A \text{ and } B) = P(A \cap B)$
$P(A \text{ or } B) = P(A \cup B)$

FINANCIAL management

- cash flow = total income − total expenses

Consumer math

- $I = Prt$ (P: principle, r: rate, t: time/years, I: interest)
- $MV = P\left(1 + \frac{r}{n}\right)^{nt}$ (MV: matured value, P: principle)
  rate = yearly interest rate
  n = number of interest compounded in a year
  t = term (years)
- Return on investment
  $ROI = \frac{\text{total return}}{\text{initial investment}} \times 100\%$
- Average cost
  $= \frac{\text{investment amount}}{\text{n of share units}}$
- total repayment
  $A = P + Prt$
- loan amount
  = purchase price − down payment
- monthly instalment
  $= \frac{A}{n}$

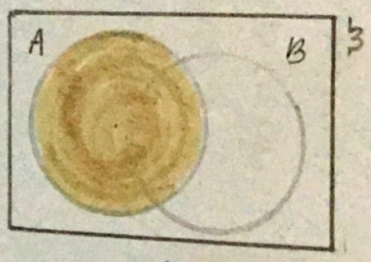
Sets

* n = number of items in the set
$n\{\}$ = total number of items
x' = opposite

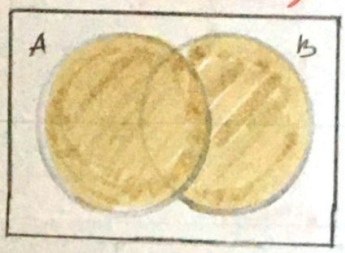
$A = \{2, 4, 5, 6, 9\}$ and $B = \{2, 3, 5, 6, 7, 9, 10\}$

$A \cap B = \{2, 5, 6, 9\}$
(union)

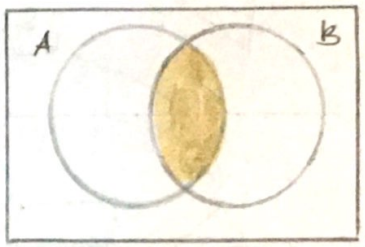
$A \cup B = \{2, 3, 4, 5, 6, 7, 9, 10\}$
(All)



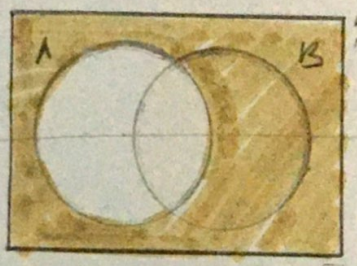
A



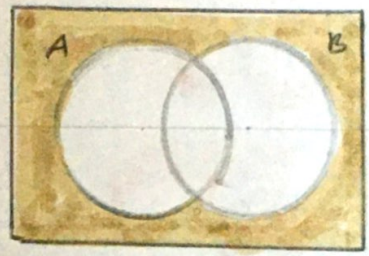
$A \cup B$



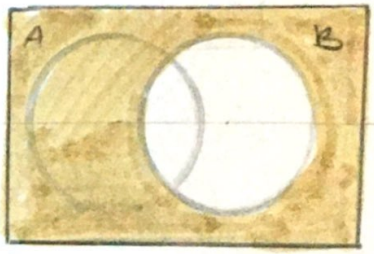
$A \cap B$



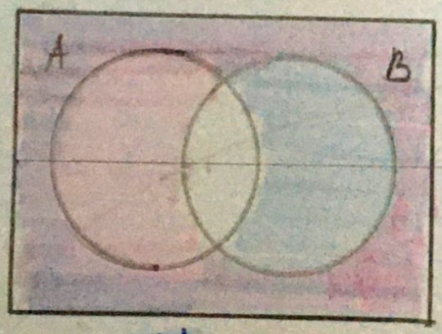
A'



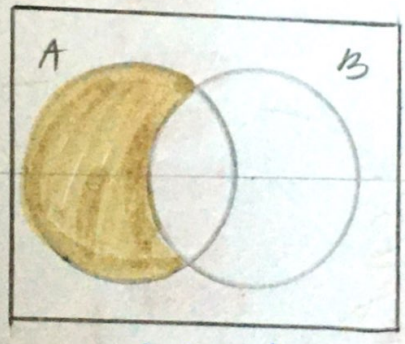
$(A \cup B)'$



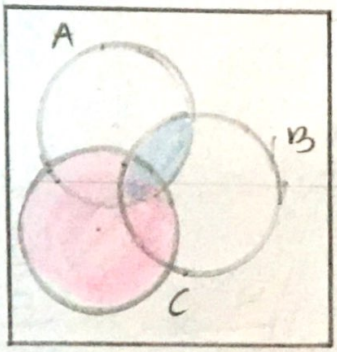
$(A \cap B)'$



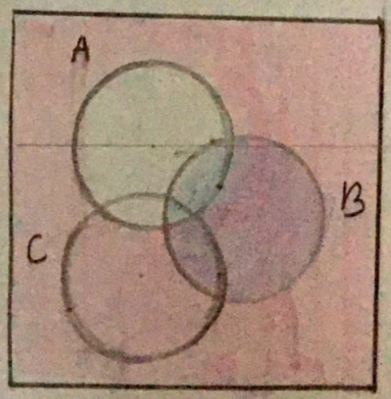
$A' \cup B'$



$A \cap B'$



$(A \cap B) \cup C$



$A' \cup B$

extras

- $\emptyset$: empty set / no item
- $A \subseteq B$ =

- if $A = \{1, 2, 3\}$,
then $1 \in A$, $2 \in A$ (1 in A, 2 in A)
but $4 \notin A$ (4 not in A)

transformation

rotation

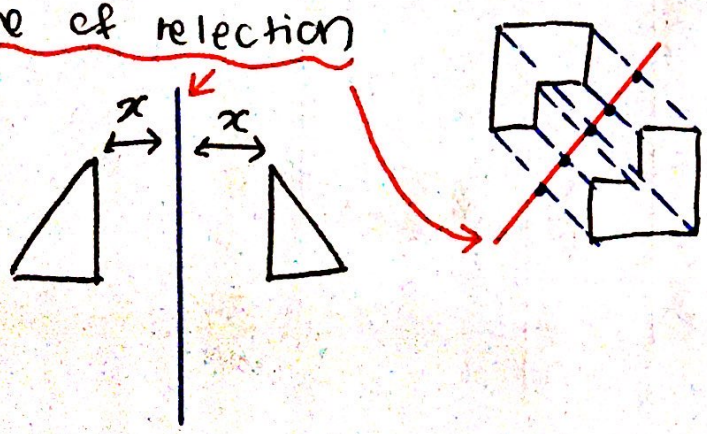
- angle of rotation (90°, 180°, 360°)
- point of rotation
- direction of rotation (clockwise / anticlockwise)

translation

- $(x, y) \rightarrow \begin{pmatrix} x \\ y \end{pmatrix}$ moves to:
- right = x or $y > 0$
- left = x or $y < 0$

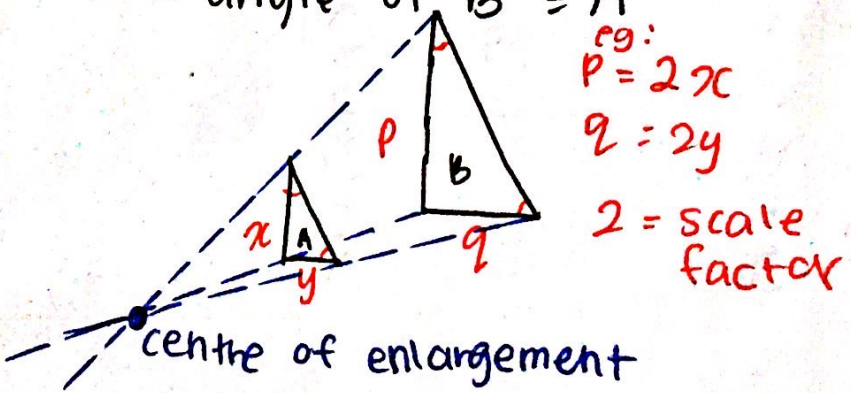
reflection

→ B = A in distance from line of reflection



enlargement

- angle of B = A



eg:
$p = 2x$
$q = 2y$
2 = scale factor

بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ

Semoga Tahsya Dafyna memperoleh 9A+ SPM 2024.
Amin :)