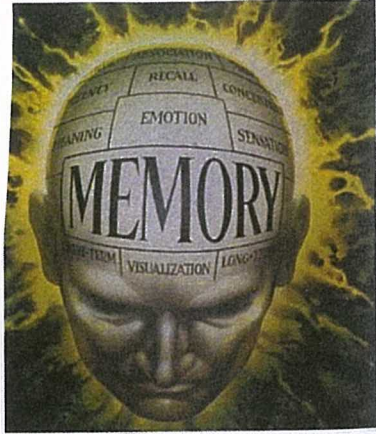


MATH & MEMORY



BARK'S DISCOVERY

METHOD

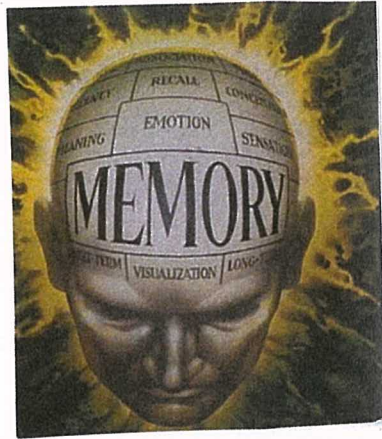
BOOK 2

FOR SECONDARY SCHOOLS

FREE RANGE LEARNING

THE **3RS** THE PROFESSIONAL WAY

MATH & MEMORY



BARK'S DISCOVERY

METHOD

BOOK 2

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THE **3RS** THE PROFESSIONAL WAY

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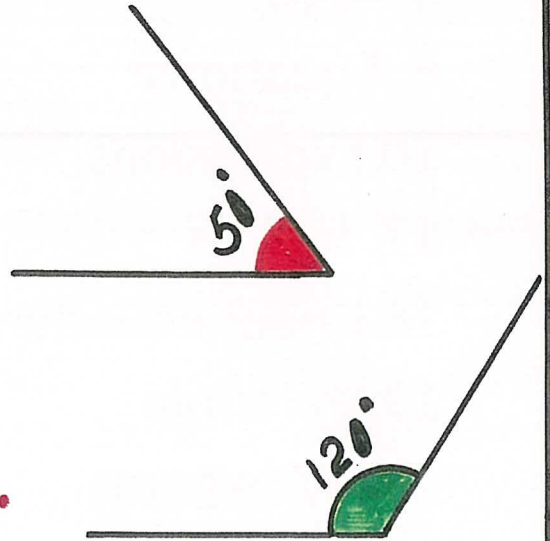
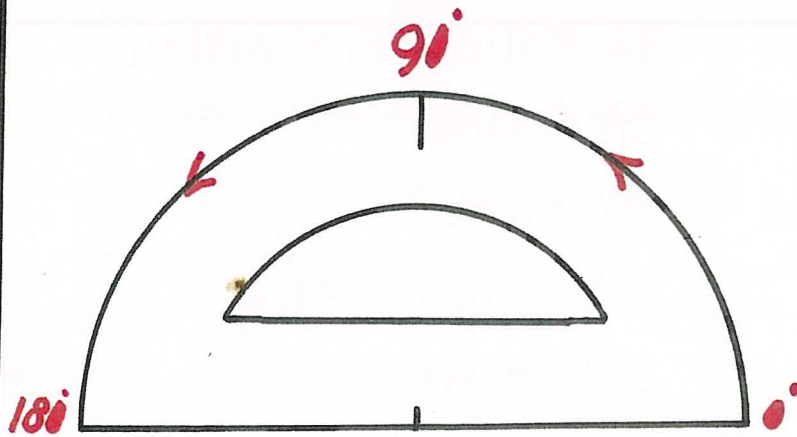
ANGLES

NOT ANGELS

A

CIRCULAR MEASURE IN DEGREES

WITH PROTRACTOR

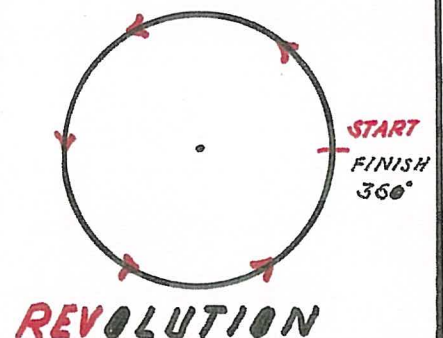
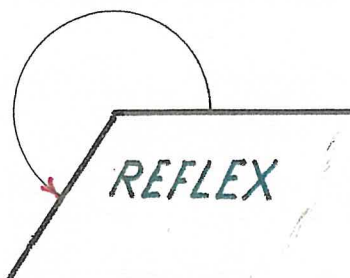
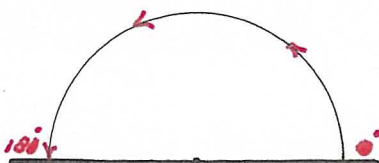
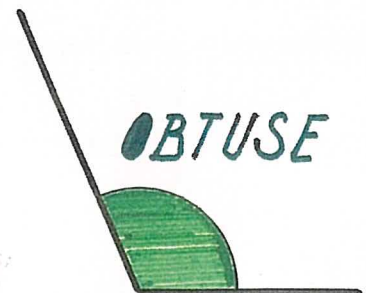
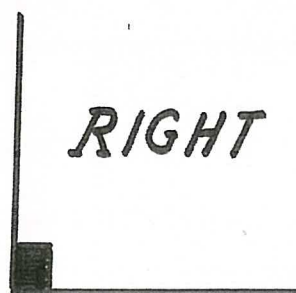
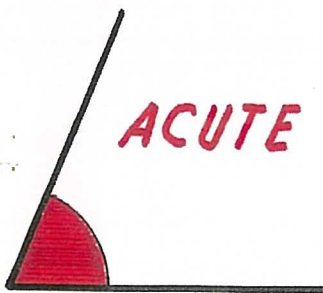


15/3/24

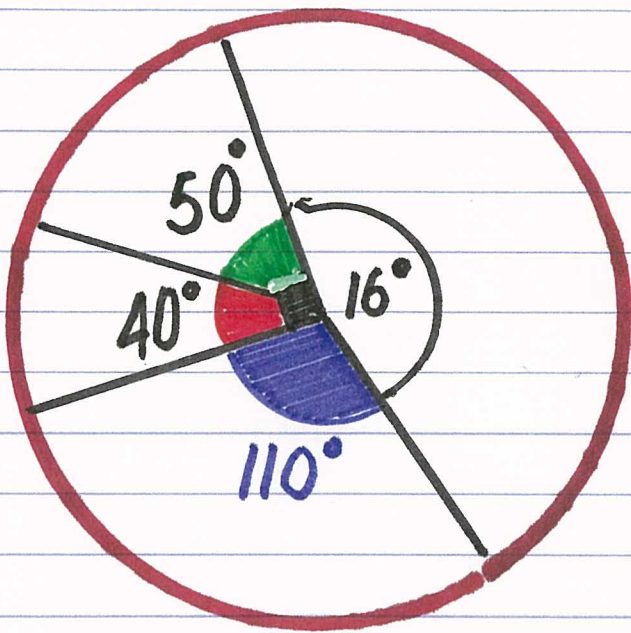
ANGLES

ACCORDING TO SIZE

3.



ANGLES



CIRCLE x°

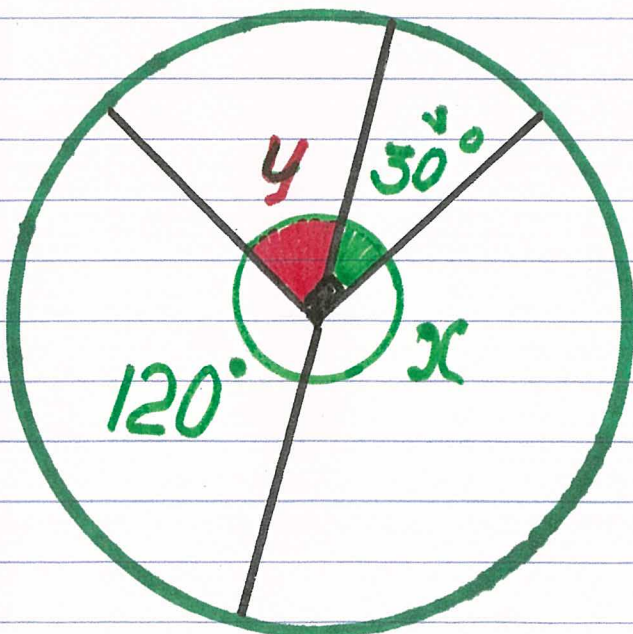
$$x =$$

COMPLEMENT OF 50° IS 40°

COMPLEMENT OF 70° IS

SUPPLEMENT OF 50° IS 130°

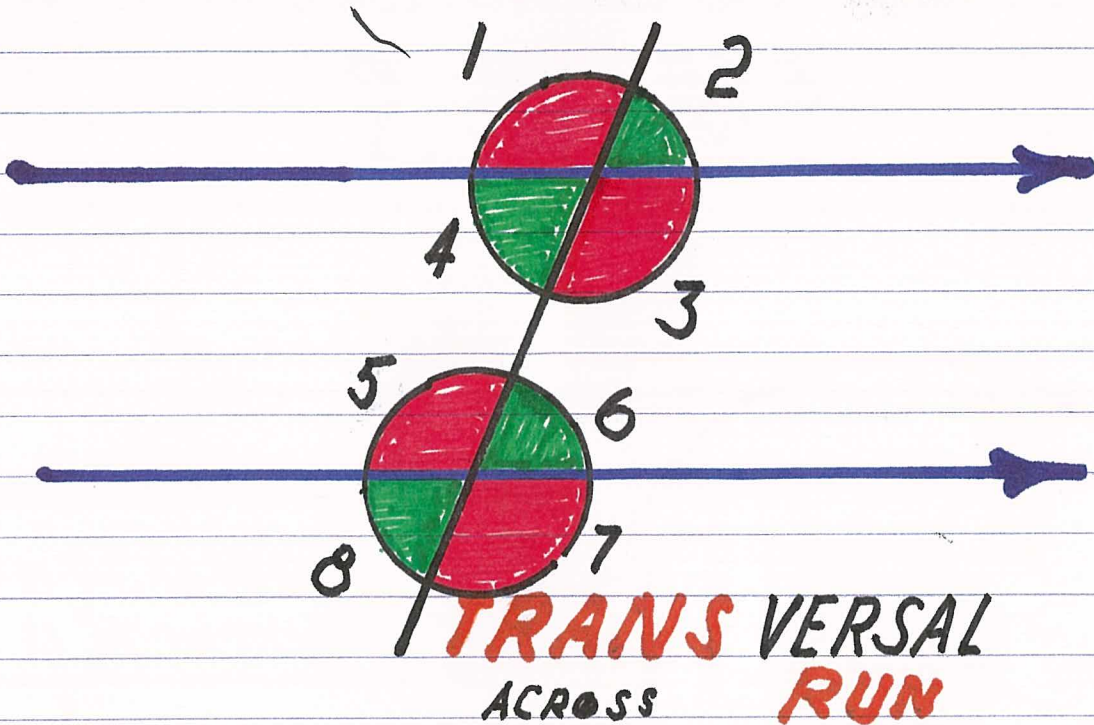
SUPPLEMENT OF 60° IS



$$y =$$

$$x =$$

ANGLES



OPPOSITE

$\hat{2} \text{ \& } \hat{4}, \hat{6} \text{ \& } \hat{8}, \hat{1} \text{ \& } \hat{3}, \hat{5} \text{ \& } \hat{7}$

CORRESPONDING

$\hat{4} \text{ \& } \hat{8}, \hat{5} \text{ \& } \hat{1}, \hat{7} \text{ \& } \hat{3}, \hat{2} \text{ \& } \hat{6}, \hat{5} \text{ \& } \hat{1}$

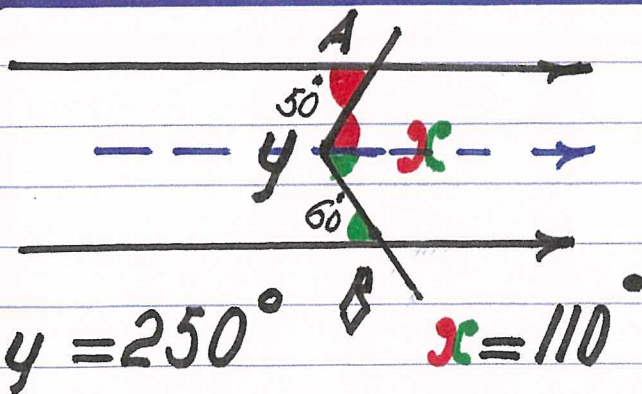
ALTERNATE

$\hat{5} \text{ \& } \hat{3}, \hat{4} \text{ \& } \hat{6}$

CO-INTERIOR

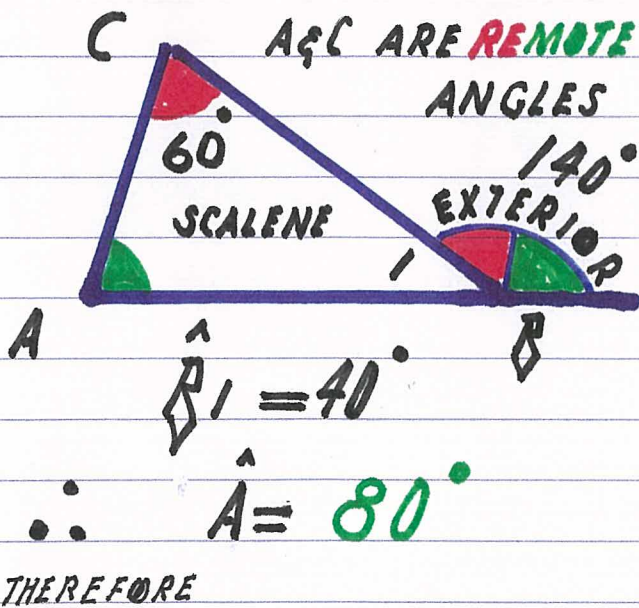
RED + GREEN = 180°

$\hat{3} \text{ \& } \hat{6}, \hat{4} \text{ \& } \hat{5}$



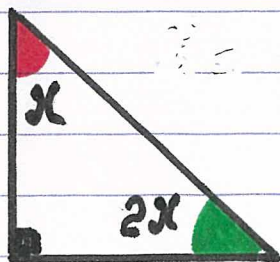
$\hat{A} = 70^\circ$
 $\hat{B} = 30^\circ$

ANGLE SUM TRIANGLE

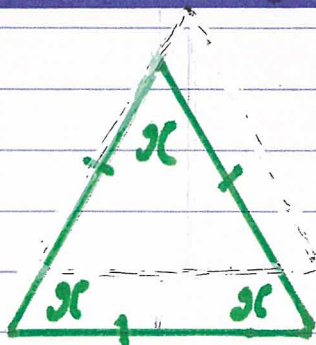


EXTERIOR 160°
 $\hat{C} = 80^\circ$ $\hat{B}_1 =$

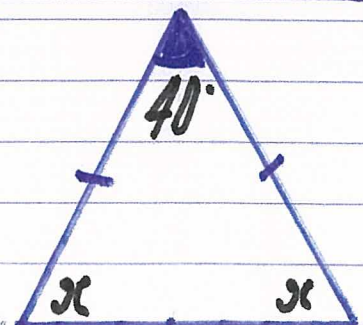
EQUAL LEGS
ISOSCELES



RIGHT TRIANGLE



EQUILATERAL
EQUAL SIDES



ISOSCELES

AREA

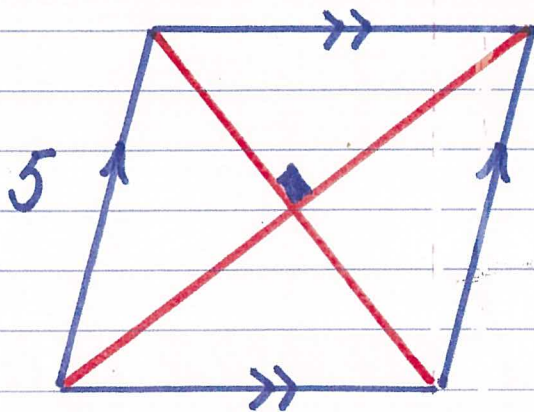
4 cm SQUARE

16 cm²

6 cm SQUARE

RECTANGLE 6x4 cm 24 cm²

RECTANGLE 7x8 cm



5 cm

ACROSS ANGLE

DIAGONALS 6 & 8 cm

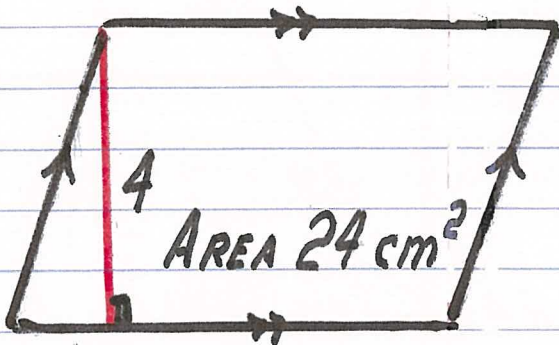
AREA 24 cm

RHOMBUS

DIAGONALS

ACROSS ANGLE

5 & 10 cm



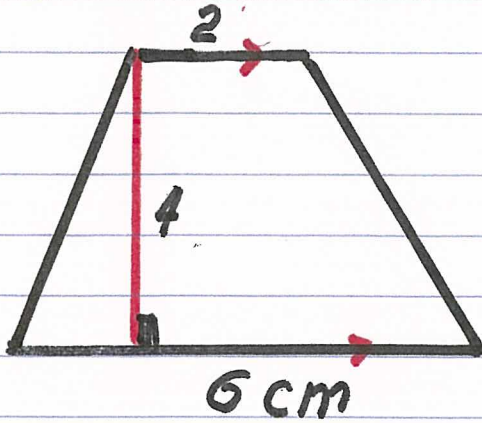
6 cm

PARALLELOGRAM

BASE 8 cm

HEIGHT 6 cm

AREA



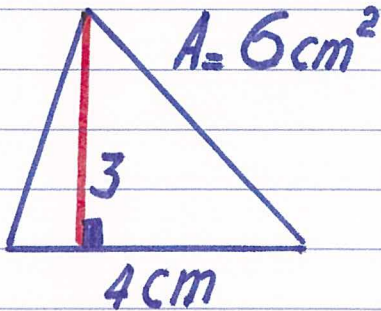
$A = 16 \text{ cm}^2$

TRAPEZIUM

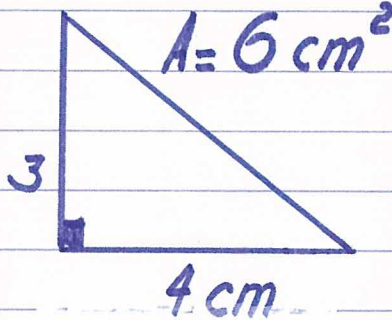
8 & 16 cm

PARALLEL SIDES

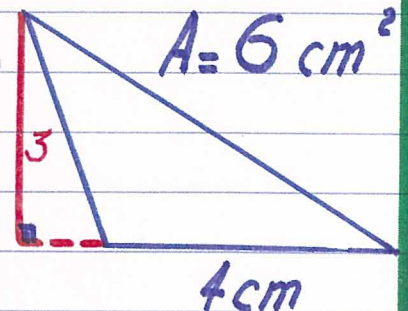
HEIGHT 7 cm



ACUTE

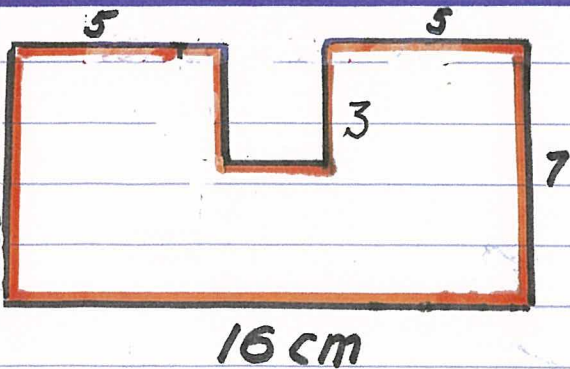


RIGHT



OBTUSE

TRIANGLE: $b = 8 \text{ cm}$, $H = 5 \text{ cm}$



16 cm

SCALE 1:2

AREA & PERIMETER

AROUND MEASURE

PERISCOPE

AROUND SEE

EQUATIONS

$$x + 9 = 17$$

$$x = 8$$

$$x + 7 = 10$$

$$x - 9 = -12$$

$$x = -3$$

$$x - 7 = -2$$

$$-5a = 30$$

$$a = -6$$

$$7b = -21$$

$$\frac{x}{-10} = 4$$
$$x = -40$$

$$\frac{4}{-5} = -7$$

EQUATIONS

$$x^2 = 121$$

$$x = \pm 11$$

$$x^2 = 225$$

$$\sqrt{2x} = 6$$

$$x = 18$$

$$\sqrt{3x} = 9$$

$$x^3 = -64$$

$$x = -4$$

$$a^3 = -125$$

$$\sqrt[3]{3x} = 6$$

$$x = 72$$

$$\sqrt[3]{2x} = 4$$

$$5a + 8 = 28$$

$$a = 4$$

$$7a + 5 = 26$$

$$12a - 5 = 19$$

$$a = 2$$

$$10x - 7 = 13$$

$$3x^2 = 21$$

$$x = \pm \sqrt{7}$$

$$5x^2 = 45$$

$$\sqrt{2x-9} = 5$$

$$x = 17$$

$$\sqrt{3x-6} = 6$$

EQUATIONS

$$2a - 5a = 9$$

$$a = -3$$

$$12 - 24 = 4$$

$$17x - 35 = 13x - 19$$

$$5x = x - 80$$

$$3(x - 2) = -4$$

$$3x - 6 = -4$$

$$x = \frac{2}{3}$$

$$4(a - 3) = 12$$

$$5(x - 2) - (x - 3) = 0$$

$$5x - 10 - x + 3 = 0, \quad x = 1\frac{3}{4}$$

$$6(x - 2) - 2(8 - 2x) = 0$$

EQUATIONS

$$\frac{x}{2} = \frac{8}{x}$$

$$x^2 = 16, x = \pm 4$$

$$\frac{x}{4} = \frac{9}{x}$$

~~$$\frac{x+12}{x+2} = \frac{3}{5}$$~~

$$5x+60 = 3x+6$$

$$x = -27$$

$$\frac{x+6}{x+1} = \frac{2}{7}$$

$$\sqrt{6x-4} = \sqrt{x+16}$$

$$x = 4$$

$$\sqrt{8x+2} = \sqrt{x-19}$$

$$x - \frac{x}{3} = 8$$

$$x = 12$$

$$x - \frac{x}{5} = 8$$

~~$$\frac{x+6}{4} = \frac{x-5}{3}$$~~

$$x = 38$$

$$\frac{a+7}{5} = \frac{a-3}{4}$$

EXPRESSIONS

MONOMIALS

$$5b, 6xy$$

$$5 \times b, 6 \times x \times y$$

BINOMIALS

$$3b + 5c$$

TRINOMIALS

$$x^2 + 2x - 3$$

QUADRATIC EXPRESSION

$$a + a + a + a = 4a$$

$$a + a + a + a + a + a$$

(INDICES) INDEX $\rightarrow 5$

$$a \cdot a \cdot a \cdot a \cdot a = a^5$$

$$a a a a a a a a$$

$$2ab + 6ba = 8ab$$

$$(2 \times 3 = 3 \times 2)$$

$$3ac + 7ca$$

EXPRESSIONS

$$-2+3+4-5+6-9=-3$$

$$5-7-2+6+4-8$$

$$2t \times 3t = 6t^2$$

$$4a \times 2a$$

$$-5x \times 2x = -10x^2$$

$$-6y \times 3y$$

$$-7a \times -3 = 21a$$

$$-8b \times -2$$

$$8t \div 2 = 4t$$

$$21t \div 3$$

$$-9x \div 3 = -3x$$

$$-15y \div 3$$

$$-16a \div -2 = 8a$$

$$-24t \div -3$$

$$5 - -3 = 8$$

$$6 - -5$$

$$5 + -3 = 2$$

$$7 + -4$$

EXPRESSIONS

$$-5 + 3 = -2$$

$$-6 + 4$$

$$-5 - 3 = -8$$

$$-6 - 4$$

$$\frac{a}{3} + \frac{a}{2} = \frac{5a}{6}$$

$$\frac{x}{4} + \frac{x}{5}$$

$$\frac{a}{3} - \frac{a}{2} = \frac{-a}{6}$$

$$\frac{x}{5} - \frac{x}{4}$$

$$\frac{a}{3} \times \frac{-a}{2} = \frac{-a^2}{6}$$

$$\frac{x}{3} \times \frac{-x}{2}$$

$$\frac{a}{3} \div \frac{b}{2} = \frac{2a}{3b}$$

$$\frac{x}{5} \div \frac{y}{4}$$

$$\frac{t}{6} \div \frac{t}{5} = \frac{5}{6}$$

$t \neq 0$

$$\frac{a}{9} \div \frac{a}{4}$$

EXPRESSIONS

$$2x + 4y + 5x - 2y - 9x \\ = 2y - 2x$$

$$3x + 5y + 6x - 3y - 10x$$

$$\frac{-12m}{n} \times \frac{a}{-2b} = \frac{6ma}{nb}$$

$$\frac{-15x}{z} \times \frac{c}{-3y} =$$

EXPRESSIONS

$$\frac{5x}{6} \cdot \frac{104}{3} = \frac{2x}{44}$$

$$\frac{4a}{7} \cdot \frac{5b}{9} = \text{---}$$

$$4xy \times 2x = 8x^2y$$

$$5ab \times 7ab$$

$$7x - x = 6x$$

$$9a - a$$

$$7x \div x = 7 \quad x \neq 0$$

$$6a \div a$$

$$12ab : 3a^2 = 4b : a \quad a \neq 0$$

$$15a^2b^2 : 3ab$$

EXPRESSIONS

RECTANGLE

$(x+2)$ by $(x-3)$ cm

$$A = (4x-2)$$

$$A = (x+2)(x-3) \text{ cm}^2 \rightarrow$$

$$= (x^2 - x - 6) \text{ cm}$$

RECTANGLE

$(x+5)$ by $(x-1)$ cm

$$(x+2)(x-3)$$

COMBINE STEPS 2 & 3 MENTALLY!
 EFFICIENCY!
 $+2x - 3x = -x$

h HORSES, c chickens

$(4h+2c)$ legs, $(h+c)$ heads

DOUBLE THE SUM OF x & y

$$2(x+y)$$

TRIPLE THE SUM

DOUBLE THE SQUARE OF THE SUM $2(x+y)$

TRIPLE THE SQUARE

DOUBLE THE **PRODUCT**: $2xy$

TRIPLE THE AVERAGE: $3\left(\frac{x+y}{2}\right)$

TRIPLE THE PRODUCT

DOUBLE THE AVERAGE

INCREASE BY 2, THE DIFFERENCE:

$$x - y + 2$$

INCREASE BY 5 THE DIFFERENCE

DECREASE BY 3 THE QUOTIENT $\frac{x}{y}$

DECREASE BY 5 THE QUOTIENT

EXPRESSIONS

FACTORISING

$$\frac{5a-b}{2b-10b} = \frac{(5a-b)}{-2(5a-b)}$$

PROVIDED
 $5a \neq b$

$$= -\frac{1}{2}$$

FACTORISING

$$\frac{(6x^2 - 3x)}{2x - 1}$$

$$2x - 1$$

EXPANDING

$$3x(2x-1) = 6x^2 - 3x$$

$$-4x(3x-2) = -12x^2 + 8x$$

$$(x+1)(x+2) = x^2 + 3x + 2$$

$$(x-3)(x+5) = x^2 + 2x - 15$$

$$(x-2)(x-3) = x^2 - 5x + 6$$

EXPANDING

$$5(3x-4)$$

$$-6a(2a-3)$$

$$(x+2)(x+3)$$

$$(x-4)(x+6)$$

$$(x-3)(x-5)$$

$$a^2 - b^2 = (a+b)(a-b)$$

$$a^2 - 25 = (a+5)(a-5)$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$x^2 - y^2$$

$$x^2 - 36$$

$$(x+y)^2$$

$$(x-y)^2$$

INDEX - INDICES

$$a^2 \times a^3 = a^5$$

$$x^4 \times x^5$$

$$a \times a^2 = a^3$$

$$x \times x^4$$

$$a^5 \div a^2 = a^3$$

$$x^7 \div x^3$$

$$a^4 \div a = a^3$$

$$x^3 \div x$$

$$a \div a^4 = a^{-3}$$

$$x \div x^4$$

$$(6y^4)^2 = 36y^8$$

$$(5x^3)^2$$

$$a^3 \div a^3 = a^0 \text{ or } 1$$

$$a^5 \div a^5$$

LINEAR EQUATIONS STRAIGHT LINES

DES CARTESIAN COORDINATES (x, y)

$$y = 2x - 3$$

Plot
(0, -3)
(2, 1)
(3, 3)

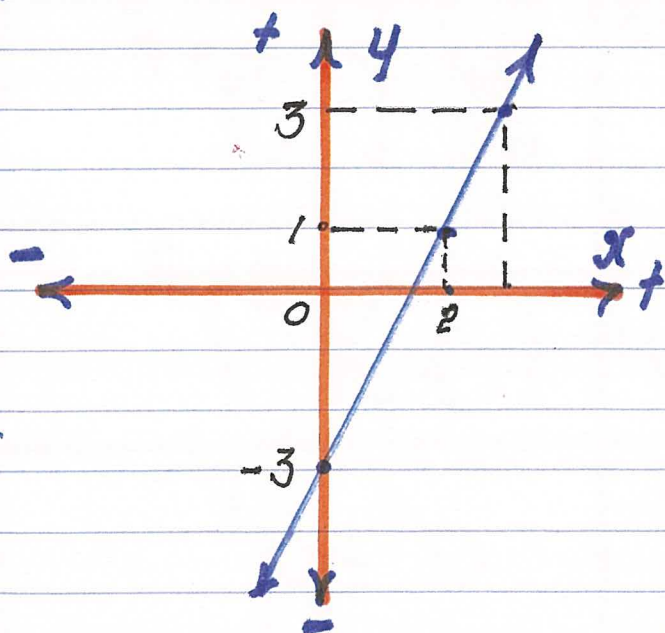
USE 3 POINTS

If $x=0, y=-3$

If $x=2, y=1$

If $x=3, y=3$

EVENTUALLY ALL MENTALLY
WITHOUT (), (), ()



Plot
 $y = x + 3$

ONLY USE 3 POINTS

2 AND 1 TO CHECK.

DO NOT WASTE TIME USING
MORE THAN 3x2 MEASUREMENTS

PARABOLAS

$$y = x^2 + 2x - 3$$

$$= (x+3)(x-1)$$

$$\text{IF } y = 0, \quad x = -3 \text{ OR } 1$$

CALLED THE ROOTS
OR THE ZEROS

1. PLOT $(-3, 0)$ & $(1, 0)$
2. AXIS OF SYMMETRY: AVERAGE OF -3 & 1 ; $x = -1$
3. SUBSTITUTE: VERTEX (HERE MINIMUM) $(-1, -4)$
4. PLOT A FEW OTHER POINTS: (x, y)
5. y -INTERCEPT $(0, -3)$
6. USE A FLEXI ROLLER TO DRAW THE PARABOLA

PARABOLA

$$y = x^2 - 4$$

$$= (x-2)(x+2)$$

SEE
EXPRESSIONS

16

1. PLOT THE ZEROS: THE x -INTERCEPT
2. AXIS OF SYMMETRY
3. CALCULATE THE VERTEX (HERE: y -INTERCEPT)
4. PLOT MORE POINTS (x, y)
5. USE A FLEXI RULER

TO DRAW THE PARABOLA:

THIS ONE WILL BE CONCAVE UP

SO THE VERTEX IS A { MINIMUM
LOWEST POINT

POSITIVE CO-EFFICIENT OF x^2

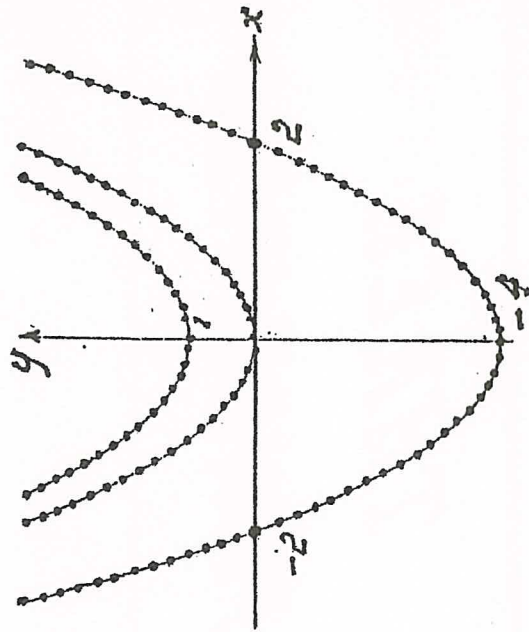
PARABOLA CONCAVE UP

747.

**THREE
POSSIBILITIES**

**$y = x^2 + 1$ NO REAL ROOTS
 y IS POSITIVE DEFINITE**

**$y = x^2$ EQUAL REAL ROOTS
 $x = 0$
 $y \geq 0$**



**$y = x^2 - 4 = (x-2)(x+2)$ 2 REAL ROOTS
 $x = \pm 2$
 y IS INDEFINITE
NEGATIVE, ZERO, POSITIVE**

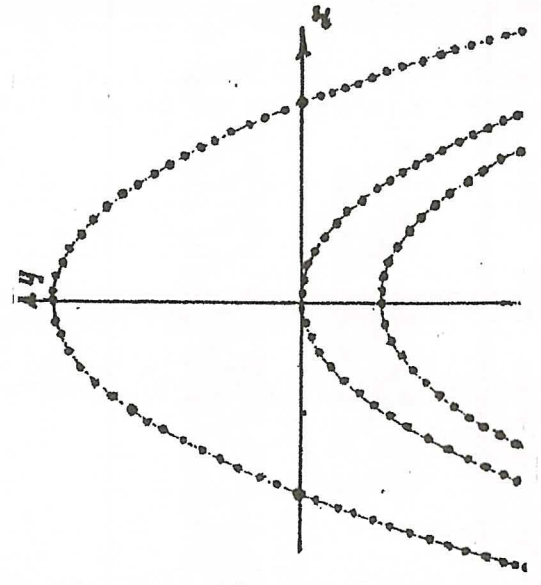
NEGATIVE COEFFICIENT OF x^2

PARABOLA CONCAVE DOWN

748.

THREE
POSSIBILITIES

$y = -x^2 - 1$ NO REAL ROOTS
 y IS NEGATIVE DEFINITE



$y = -x^2$ EQUAL, REAL ROOTS
 $y \leq 0$ $x=0$

$y = 4 - x^2 = -(x-2)(x+2)$ 2 REAL ROOTS
 y IS INDEFINITE $x=+2$

STEEP

$$y = 2x^2$$

POSITIVE CO-EFFICIENT

CONCAVE UP

STANDARD PARABOLA

$$y = x^2$$

CONCAVE UP

SHALLOW

$$y = \frac{1}{2}x^2$$

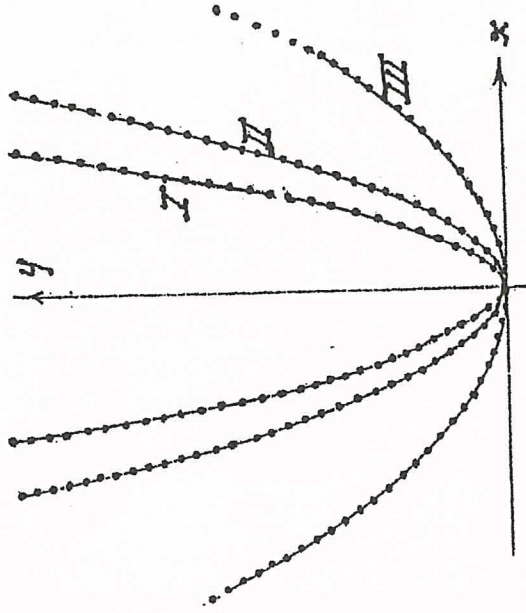
CONCAVE UP

THE CO-EFFICIENT OF x^2 INFLUENCES THE SHAPE

WHEN $x = 0$, $y = 0$
EQUAL, REAL ROOTS

FOR ALL OTHER VALUES OF x , $y > 0$

745.



746.

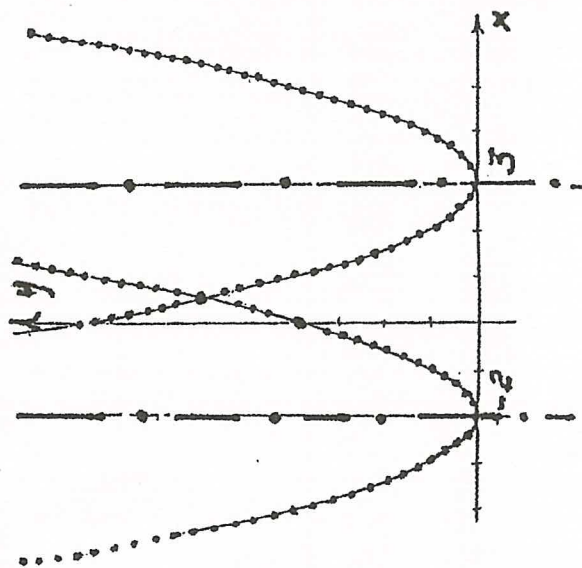
$$y = x^2 - 6x + 9$$

$$y = (x - 3)^2$$

CONCAVE UP

Equal Roots $x = 3$

AXIS



$$y = x^2 + 4x + 4$$

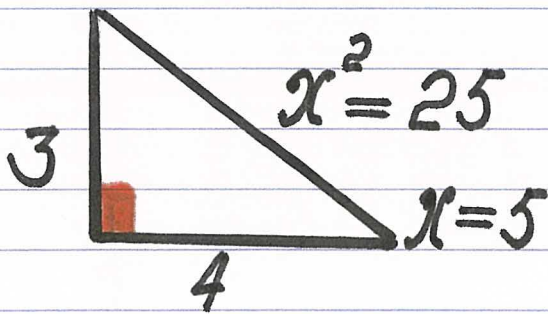
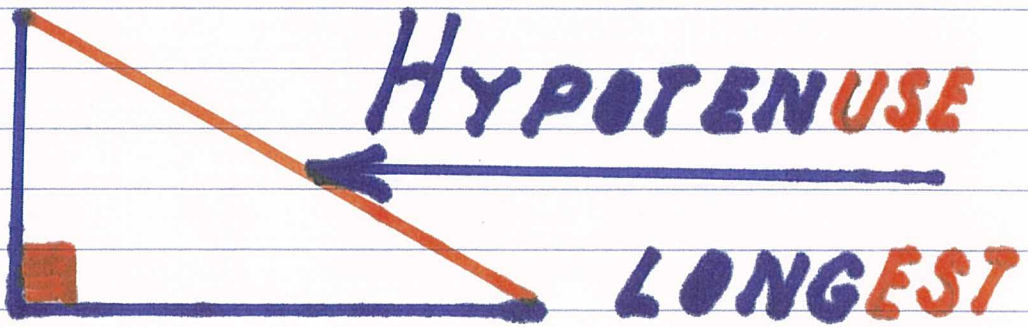
$$y = (x + 2)^2$$

CONCAVE UP

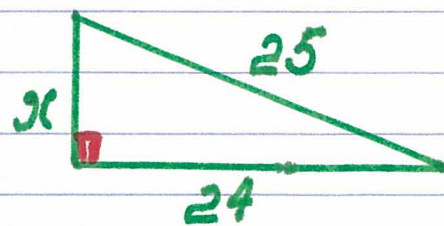
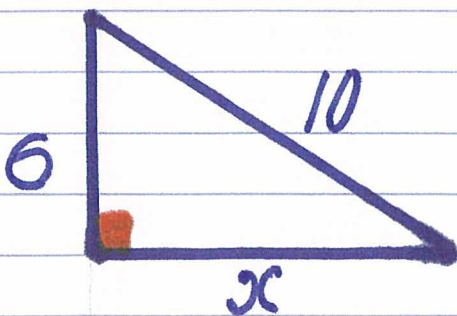
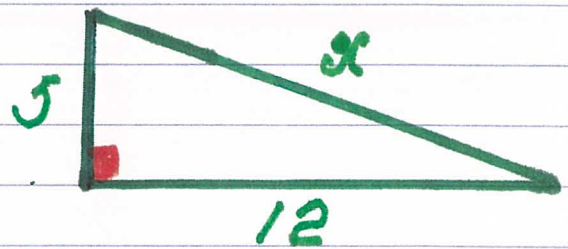
Equal Roots $x = -2$

AXIS

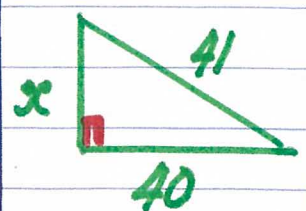
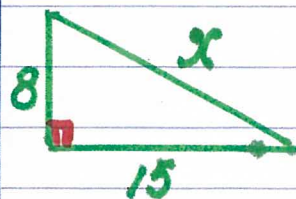
PYTHAGORAS



NOT TO SCALE!



$$x^2 = 64, x = 8$$



QUADRATIC EQUATIONS

$$x^2 - 6x = x(x-6) = 0$$

$$x = 0 \text{ or } x = 6$$

$$2x^2 - 6x = 0$$

$$3x^2 - 12 = 3(x^2 - 4) = 0$$

REMEMBER: THE DIFFERENCE OF 2 SQUARES
 $(x^2 - 4) = (x+2)(x-2) = 0 \therefore x = \pm 2$

$$3x^2 - 27 = 0$$

$$x^2 - x - 12 = (x-4)(x+3) = 0 \quad \begin{array}{l} x=4 \\ x=-3 \end{array}$$

$$x^2 - 7x + 6 = 0$$

QUADRATIC EQUATIONS

$$4(x^2 - 7) = 8$$

$$x = \pm 3$$

$$5(x^2 - 12) = 20$$

$$x(4 - x) = 0$$

$$x = 0 \text{ OR } x = 4$$

$$a(7 - a) = 0$$

$$3x(1 - 4x) = 0$$

$$x = 0 \text{ OR } x = \frac{1}{4}$$

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

$$(5x - 2)(3x + 3) = 0$$

$$x = \frac{2}{5} \text{ OR } x = -1$$

$$(6x - 5)(6x + 3) = 0$$

QUADRATIC EQUATIONS

ALL PURPOSE FORMULA

GENERAL FORM $ax^2 + bx + c$

$$\boxed{2x^2 - 3x - 7 = 0}$$

↓ ↓ ↓

SUBSTITUTE

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{3 \pm \sqrt{9 + 56}}{4} \therefore x = \frac{3 \pm \sqrt{65}}{4}$$

$$3x^2 - 10x + 8 = 0$$

QUADRATIC EQUATIONS

THE DISCRIMINANT

VISUALISE THE FORMULA

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

THE DISCRIMINANT is $b^2 - 4ac$

SYMBOL Δ D IN GREEK

IF $\Delta < 0$, THERE ARE NO ROOTS

IF $\Delta = 0$, ROOTS ARE EQUAL

IF $\Delta > 0$, 2 DIFFERENT ROOTS

CHECK Δ FOR

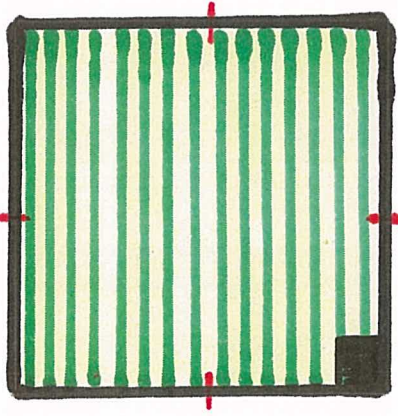
$$2x^2 - 5x + 2 = 0$$

$$3x^2 + 2x + 6 = 0$$

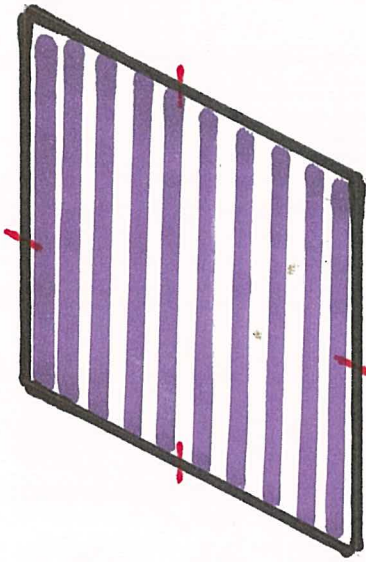
$$(x^2 - 9) = 0$$

QUADRILATERALS

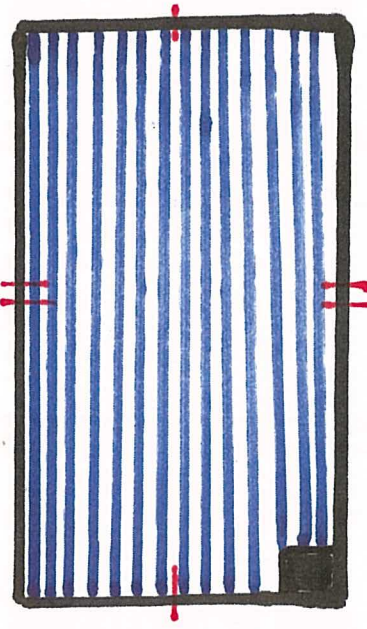
9/2



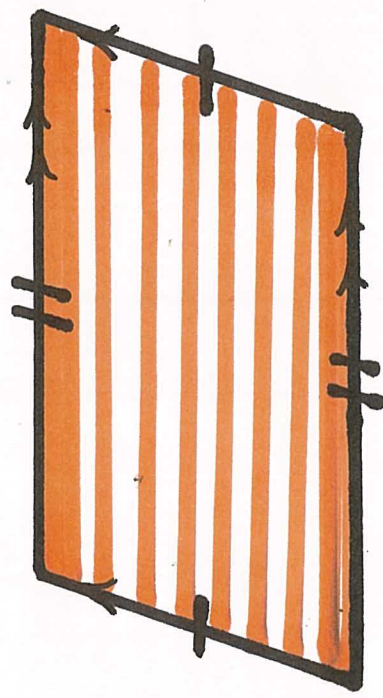
SQUARE



RHOMBUS

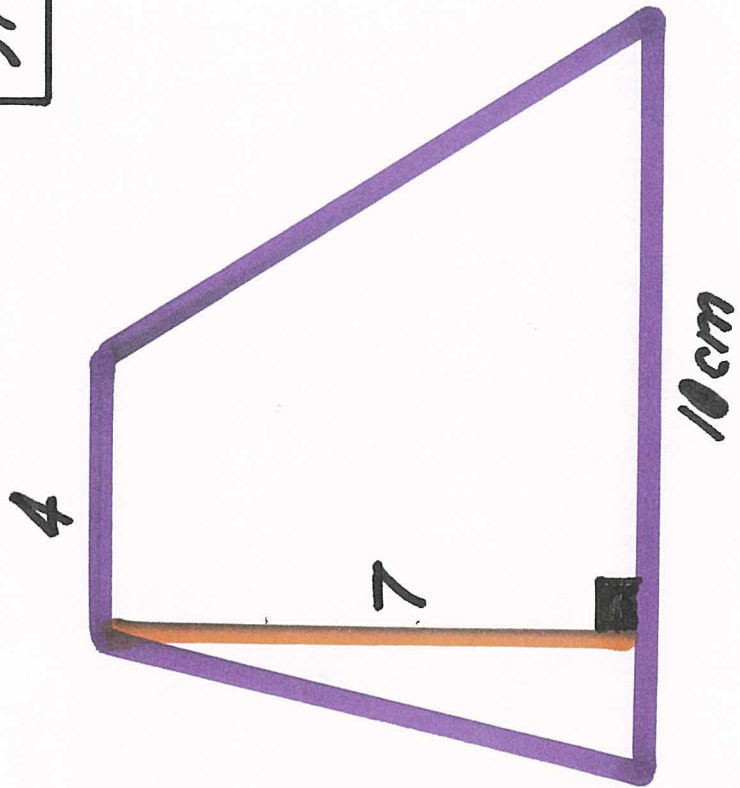


RECTANGLE



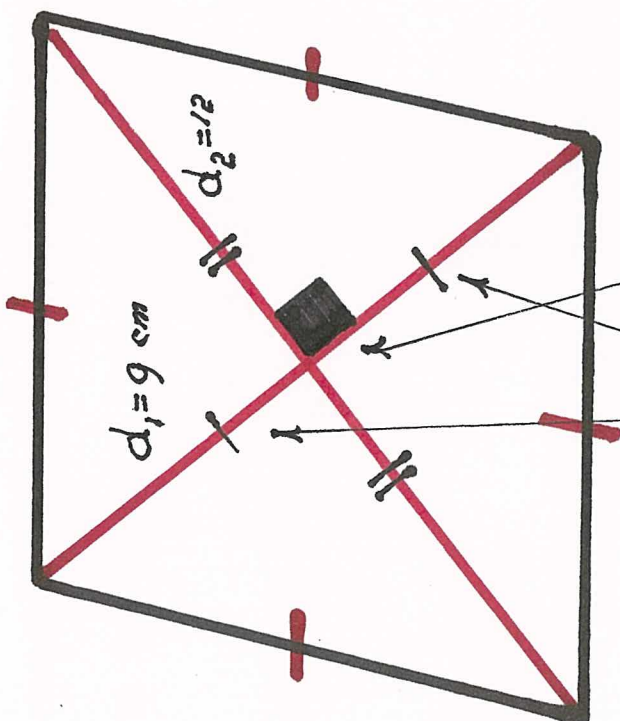
PARALLELOGRAM

9/3.



TRAPEZIUM

$$A = \frac{1}{2} (4 + 10) \times 7 = 49 \text{ cm}^2$$



AVISUAL

RHOMBUS

$$A = \frac{1}{2} d_1 \cdot d_2 = 54 \text{ cm}^2$$

RATES

9/7

GROWTH: FROM 3.5 TO 8.75^{cm}
IN 7 DAYS

DAILY RATE .75 cm

50 km/h FOR 3 HOURS
REST FOR $\frac{1}{2}$ HOUR
57 km/h FOR 2 HOURS

264 km/h IN $5\frac{1}{2}$ HOURS
AVERAGE SPEED
 $264 \div 5.5 = 48$ km/h

POPULATION: IN 5 YEARS

FROM 10700 TO 12100

INCREASE: $1400 \div 5 = 280$ P.A.

COMMISSION
\$6000 ON \$40000

WHAT % IS $\frac{\text{THIS}}{\text{OF THAT}}$ = $\frac{60}{4} = 15\%$

RATES

GROWTH

FROM 4 TO 11cm IN 7 DAYS

DAILY
RATE

80 Km/h 3 HOURS

AVERAGE

REST 1 HOUR

SPEED

60 Km/h 2 HOURS

POPULATION INCREASE

FROM 14800 TO 16900
IN 10 YEARS

YEARLY
GROWTH RATE

P.A = PER ANNUM
PER YEAR

COMMISSION

\$8000 ON \$40000

%

RATIO & PROPORTION

DIVIDE 56

$$\frac{3}{8} \text{ of } 56 = 21$$

92%

RATIO 3:5

$$\frac{5}{8} \text{ of } 56 = \frac{35}{56}$$

5.8. x . 32

$$8x = 160$$

ARE IN PROPORTION

$$x = 20$$

MODEL CAR 71 BY x mm

$$\frac{7}{420} = \frac{x}{60}$$

REAL ONE 42 BY 1.5 m

$$\frac{7}{420} = \frac{x}{1500}$$

DIVIDE

$$x = 25$$

RATIO & PROPORTION

DIVIDE 90

RATIO 2:7

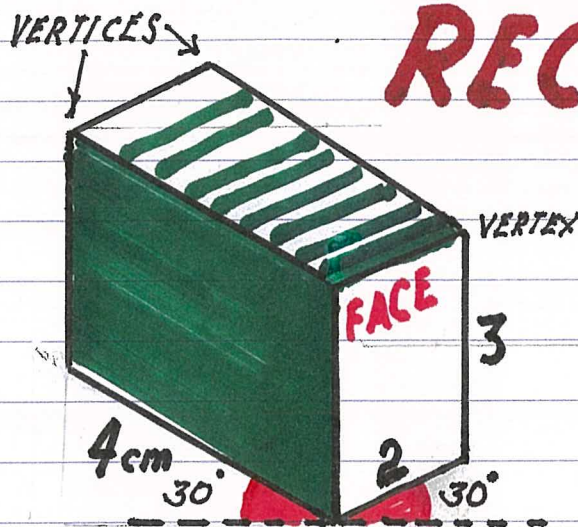
3, 6, x, 24

ARE IN PROPORTION

MODEL CAR 60mm BY x m

REAL ONE 4m BY 1.5m

SOLIDS



RECTANGULAR
PRISM

VOLUME

$$24 \text{ cm}^3$$

ISOMETRIC

SAME MEASURE

SURFACE AREA

$$(2 \times 8) + (2 \times 6) + (2 \times 12) = 52 \text{ cm}^2$$

DRAW A RECTANGULAR PRISM

$$3 \times 4 \times 5 \text{ cm}$$

CALCULATE

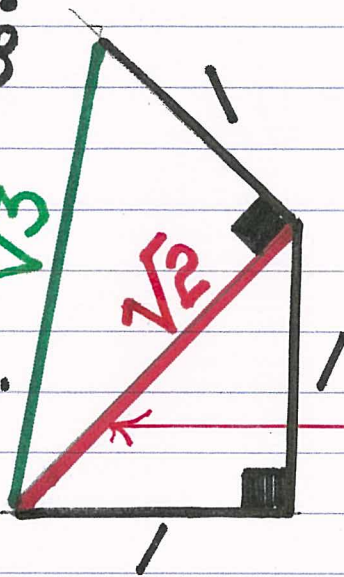
V & SA

AB SURDS

$$\sqrt{3} = 1.7320508$$

$$\sqrt{2} = 1.414213562\dots$$

INACCURATE



ACCURATE

$$2\sqrt{2} + 3\sqrt{2} = 5\sqrt{2}$$

$$4\sqrt{3} + 7\sqrt{3}$$

$$5\sqrt{6} - \sqrt{6} = 4\sqrt{6}$$

$$10\sqrt{11} - \sqrt{11}$$

$$3\sqrt{2} \times 2\sqrt{3} = 6\sqrt{6}$$

$$2\sqrt{7} \times 3\sqrt{3}$$

$$8\sqrt{15} \div 4\sqrt{5} = 2\sqrt{3}$$

$$12\sqrt{21} \div 4\sqrt{7}$$

TRI

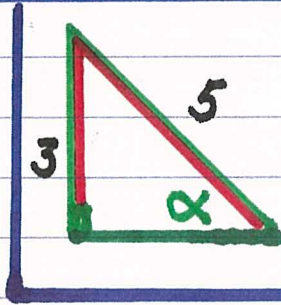
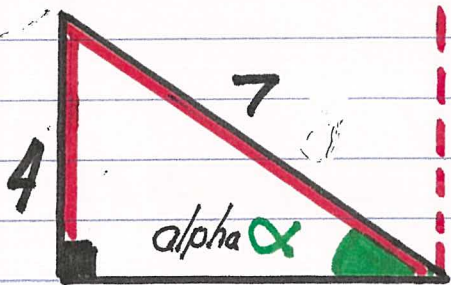
ANGLE

MEASURE

TRIGONOMETRY

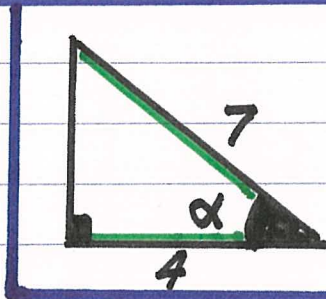
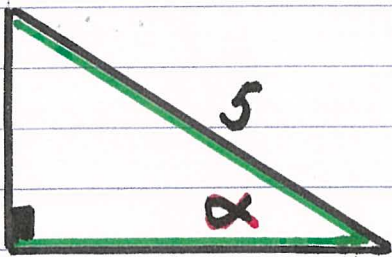
THE 3 RATIOS IN A RIGHT TRIANGLE:

A VISUAL EXERCISE

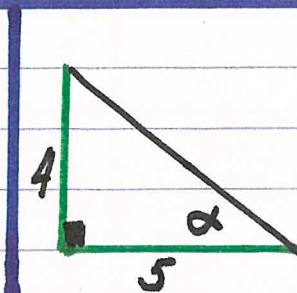
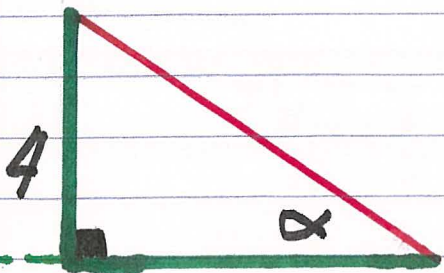


SINE $\alpha = \frac{4}{7} = \text{INVERSE SIN } \alpha = \dots$

ON CALCULATOR



COSINE $\alpha = \frac{3}{5} = \text{INV COS}, \alpha = \dots$



TANGENT $\alpha = \frac{4}{7} = \dots \text{INV. TAN}, \alpha = \dots$

ANSWERS

1 | $x = 360^\circ$; $y = 60^\circ$, $x = 150^\circ$
 THE COMPLEMENT OF $70^\circ = 20^\circ$, THE SUPPLEMENT OF $60^\circ = 120^\circ$

2 | $x = 100^\circ$, $y = 260^\circ$ | 3 | $\hat{B}_1 = 20^\circ$, $\hat{A} = 60^\circ$

3 | $3x = 90^\circ$, $x = 30^\circ$ | $3x = 180^\circ$, $x = 60^\circ$ | $2x = 140^\circ$, $x = 70^\circ$

| | | | | |
|---|-------------------------|---|----------------------------------|--|
| 4 | $6^2 = 36 \text{ cm}^2$ | RECTANGLE $A = 7 \times 8 = 56 \text{ cm}^2$ | RHOMBUS $A = 25 \text{ cm}^2$ | PARALLELOGRAM $A = 48 \text{ cm}^2$ |
|---|-------------------------|---|----------------------------------|--|

| | | | |
|---|------------------------------------|-----------------------------------|--|
| 5 | TRAPEZIUM $A = 84 \text{ cm}^2$ | TRIANGLE $A = 20 \text{ cm}^2$ | $A = 94 \text{ cm}^2$ $A = (16 \times 7) - (6 \times 3) \text{ cm}^2$ |
|---|------------------------------------|-----------------------------------|--|

| | | | | |
|---|---------|---------|----------|----------|
| 6 | $x = 3$ | $x = 5$ | $b = -3$ | $y = 35$ |
|---|---------|---------|----------|----------|

| | | | | |
|---|--------------|----------|----------|----------|
| 7 | $x = \pm 15$ | $x = 27$ | $a = -5$ | $x = 32$ |
|---|--------------|----------|----------|----------|

| | | | | |
|--|---------|---------|-------------|---------------------------|
| | $a = 3$ | $x = 2$ | $x = \pm 3$ | $3x - 6 = 36$ $x = 14$ |
|--|---------|---------|-------------|---------------------------|

| | | | | |
|---|---------|-----------|---------------------------|--|
| 8 | $y = 4$ | $x = -20$ | $4a - 12 = 12$ $a = 6$ | $6x - 12 - 16 + 4x = 0$, $x = 2\frac{8}{5}$ $x = 2\frac{4}{5}$ |
|---|---------|-----------|---------------------------|--|

| | | | | | |
|---|--------------------------|--------------------------------|-------------------------------|---------------------------|---------------------------------|
| 9 | $x^2 = 9$ $x = \pm 3$ | $7x + 42 = 2x + 2$ $x = -8$ | $8x + 2 = x - 19$ $x = -3$ | $5x - x = 40$ $x = 10$ | $4a + 28 = 5a - 15$ $a = 43$ |
|---|--------------------------|--------------------------------|-------------------------------|---------------------------|---------------------------------|

| | | | |
|----|------|-------|--------|
| 10 | $6a$ | a^8 | $10ac$ |
|----|------|-------|--------|

| | | | | |
|----|----------------|--------|----------|-------|
| 11 | $15 - 17 = -2$ | $8a^2$ | $-18y^2$ | $16b$ |
|----|----------------|--------|----------|-------|

| | | | | |
|------|-------|------|------|-----|
| $7t$ | $-5y$ | $8t$ | 11 | 3 |
|------|-------|------|------|-----|

ANSWERS

| | | | |
|-----------------|-----------------|------------------|--------------------------|
| 12 | -2 | -10 | $\frac{4}{9}$ $a \neq 0$ |
| $\frac{9x}{20}$ | $\frac{-x}{20}$ | $\frac{-x^2}{6}$ | $\frac{4x}{54}$ |
| 13 | $2y - x$ | $\frac{5cx}{yz}$ | |

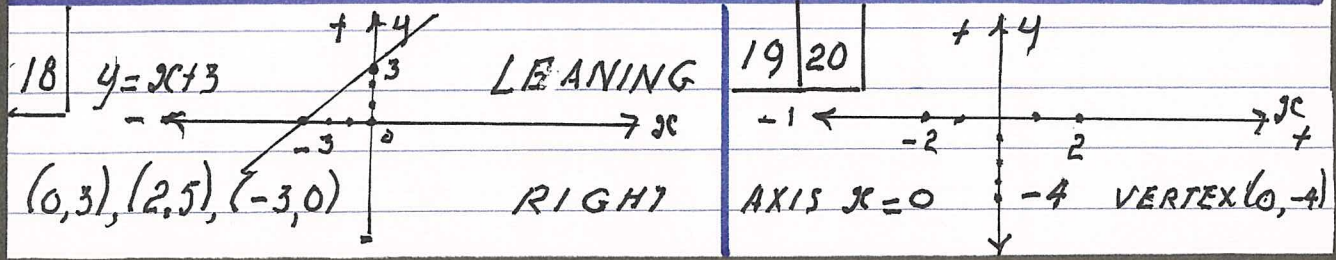
| | | | | | |
|----|-------------------|------------|-------|----------------|---------------------------------|
| 14 | $\frac{36a}{35b}$ | $35a^2b^2$ | $8a!$ | 6 $a \neq 0$ | $5ab:3$ $a \neq 0, b \neq 0$ |
|----|-------------------|------------|-------|----------------|---------------------------------|

| | | |
|----|-----------------|---------------------------------|
| 15 | $P = 4x + 8$ cm | $A = (x+5)(x-1) = x^2 + 4x - 5$ |
|----|-----------------|---------------------------------|

| | | | | |
|----------|------------|-------|-------|-----------------------|
| $3(x+y)$ | $3(x+y)^2$ | $3xy$ | $x+y$ | $\frac{x-y+5}{x/y-5}$ |
|----------|------------|-------|-------|-----------------------|

| | | | | | |
|----------------------------|-------------------------|--------------|-------------------|------------------|-----------------|
| 16 | $\frac{3x(2x-1)}{2x-1}$ | $15x - 20$ | $-12a^2 + 18a$ | $x^2 + 5x + 6$ | $x^2 + 2x - 24$ |
| $= 3x, x \neq \frac{1}{2}$ | $(x+y)(x-y)$ | $(x-6)(x+6)$ | $x^2 + 2xy + y^2$ | $x^2 - 2x + y^2$ | |

| | | | | | | | |
|----|-------|-------|-------|-------|--------------------------|---------|-----------|
| 17 | x^9 | x^5 | x^4 | x^2 | $x^{-3} = \frac{1}{x^3}$ | $25x^6$ | $a^0 = 1$ |
|----|-------|-------|-------|-------|--------------------------|---------|-----------|



ANSWERS

21 $x^2 = 25 + 144, x = 13$

$x^2 = 25^2 - 24^2, x = 7$

$x^2 = 289, x = \sqrt{289} = 17$

$x = 9$ A VISUAL

TRIADS TO REMEMBER

PYTHAGORAS WITHOUT FORMULA!

DIRECT APPROACH

MULTIPLES OF

3 : 4 : 5 → 5 : 12 : 13
 $3^2 + 4^2 = 5^2$ 3×4

6 : 8 : 10

7 : 24 : 25
ODD

8 : 15 : 17
EVEN 2

9 : 12 : 15
ETC.

9 : 40 : 41
ODD 1

VISUALISE

26 $2x(x-3) = 0$ $x = 0$ OR 3

$3(x^2-9) = 3(x+3)(x-3) = 0$ $x = \pm 3$

27 $5x^2 - 60 = 20$ $x^2 = 16$
 $x = \pm 4$

$a = 0$ OR $a = 7$

$x = 2$ OR $x = -5$

$x = \frac{5}{6}$ OR $x = -\frac{1}{2}$

28 $x = \frac{10 \pm \sqrt{100-96}}{6}$

$x = 2$ OR $x = \frac{1}{3}$

ANSWERS

29

$$\Delta = 25 - 16 = 9$$

2 ROOTS

$$3 \Delta = 4 - 72 \Delta < 0$$

NO REAL ROOTS

EQUAL ROOTS

$$x = \pm 3$$

33

1 cm

360 km in 6
60 in 1

INCREASE
21 P.A

$$8000 \div 400 =$$

$$80 \div 4 = 20\%$$

35

20 & 70

$$6x = 72$$

$$x = 12$$

$$4000x = 60 \times 1500$$

$$4x = 6 \times 15, x = 22\frac{1}{2}$$

36] $V = 60 \text{ cm}^3$

$$SA = 2(12 + 15 + 20)$$

37

$$11\sqrt{3}$$

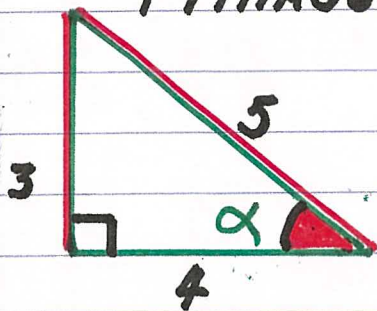
$$9\sqrt{11}$$

$$6\sqrt{21}$$

$$3\sqrt{3}$$

PYTHAGORAS TRIAD

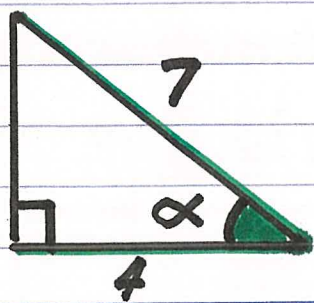
SINE = SIN



$$\text{SIN } \alpha = 3 \div 5 = \dots$$

ALMOST

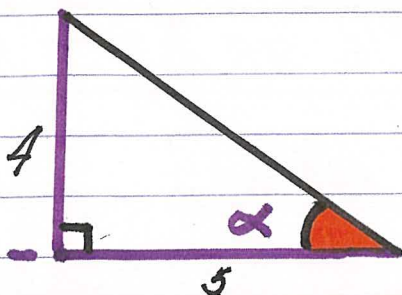
CALCULATOR INV. SIN $\alpha =$



COSINE = COS γ IN BETWEEN

$$\text{COS } \alpha = 4 \div 7 = \dots$$

INV. COS . $\alpha =$



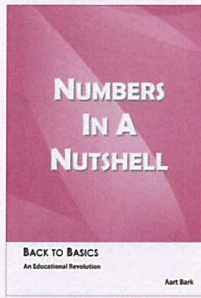
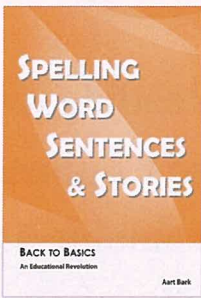
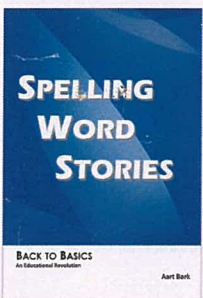
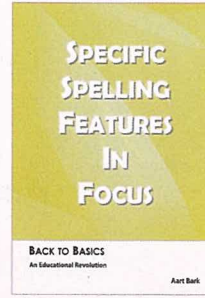
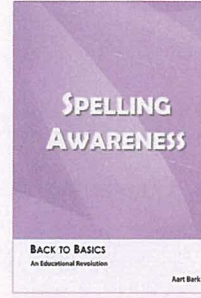
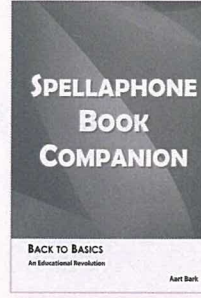
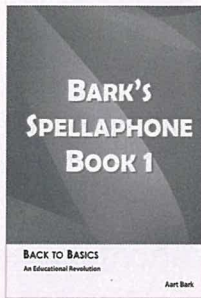
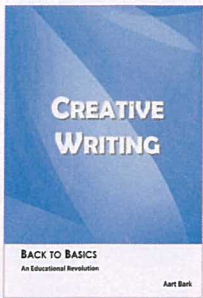
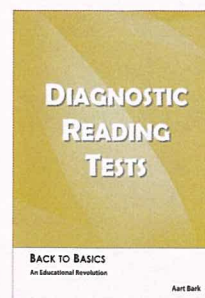
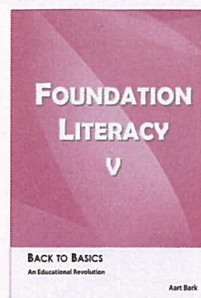
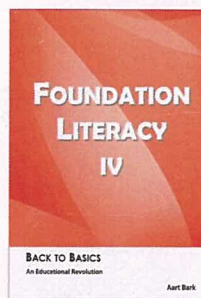
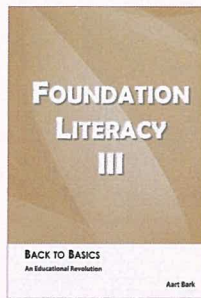
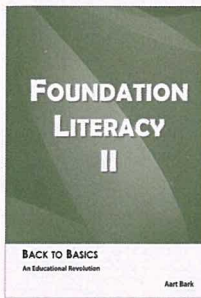
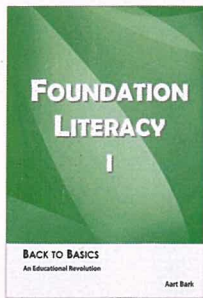
UPSIDE T

TANGENT = TAN

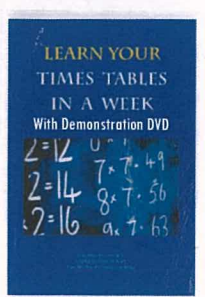
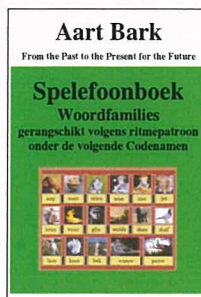
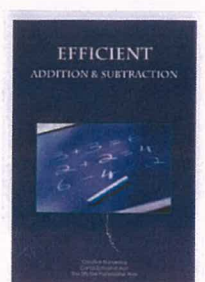
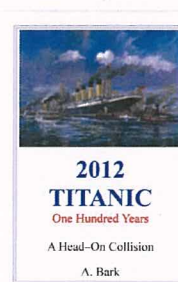
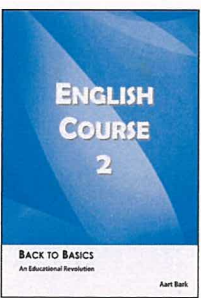
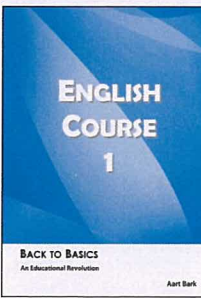
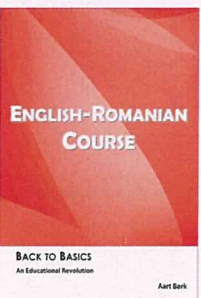
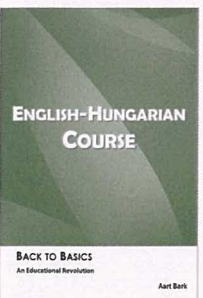
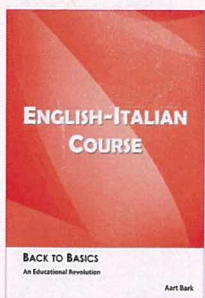
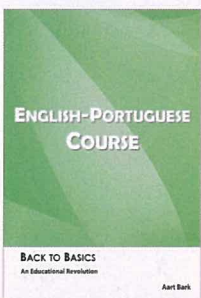
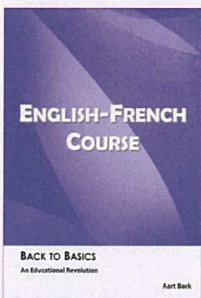
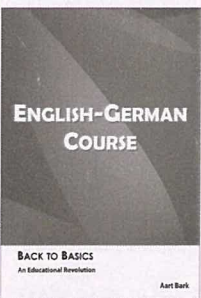
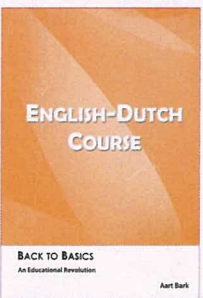
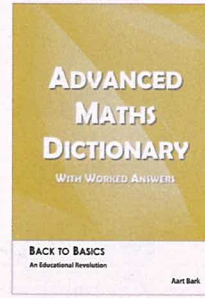
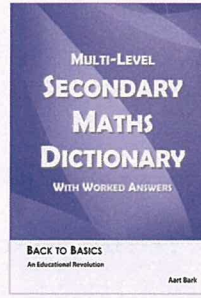
$$\text{TAN } \alpha = 4 \div 5 = \dots$$

INV. TAN

$\alpha =$



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