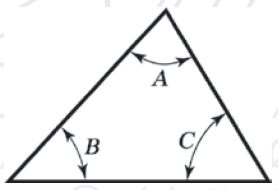
METROLOGY MATTERS

HELPFUL HINTS FROM OGP

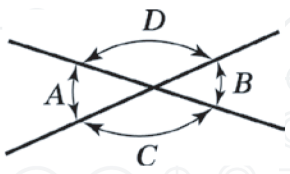
Guide to Optical Comparator Measurement

GEOMETRIC PROPOSITIONS



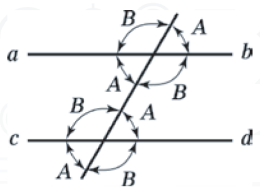
The sum of the three angles in a triangle always equals 180°. Hence, if two angles are known, the third angle can always be found.

A + B + C = 180° *A = 180° - (B + C)*
B = 180° - (A + C) *C = 180° - (A + B)*



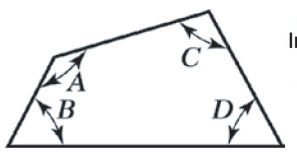
If two lines intersect, then the opposite angles formed by the intersecting lines are equal.

Angle A = Angle B
Angle C = Angle D



If a line intersects two parallel lines, then the corresponding angles formed by the intersecting line and parallel lines are equal.

Lines *ab* and *cd* are parallel. Then all the angles designated A are equal, and all those designated B are equal.



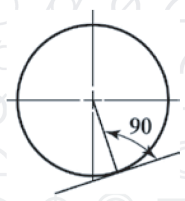
In any figure having four sides, the sum of the interior angles equals 360 degrees.

A + B + C + D = 360°

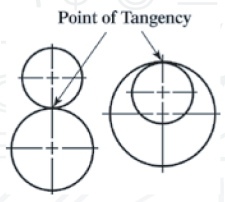
FOCUS

c-vision Lite

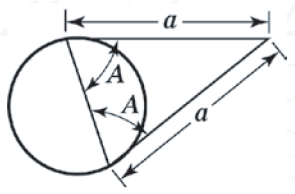
GEOMETRIC PROPOSITIONS



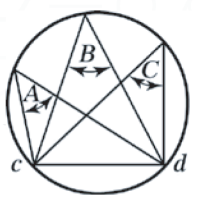
If a line is tangent to a circle, then it is also at right angles to a line drawn from the center of the circle to the point of tangency - that is, to a radial line through the point of tangency.



If two circles are tangent to each other, then the straight line that passes through the centers of the two circles of the two circles must also pass through the point of tangency.



If from a point outside a circle, tangents are drawn to a circle, the two tangents are equal and make equal angles with the chord joining the points of tangency.



All angles having their vertex at the periphery of a circle and subtended by the same chord are equal.

Angles *A, B,* and *C,* all subtended by chord cd, are equal.

c-vision Floor Model

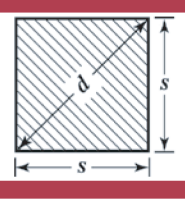
FIELD OF VIEW (FOV) CHART - HOW MUCH YOU CAN SEE

	14”	16”	20”	30”
5x	2.80”	3.20”	4.00”	6.00”
10x	1.40”	1.60”	2.00”	3.00”
20x	0.70”	0.80”	1.00”	1.50”
31.25x*	0.448”	0.512”	0.64”	0.96”
50x	0.28”	0.32”	0.40”	0.60”
62.5x	0.224”	0.256”	0.32”	0.48”
100x	0.14”	0.16”	0.20”	0.30”

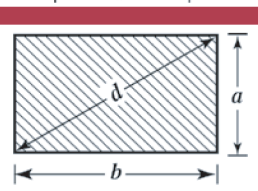
*31.25x Magnification = Using a machinists rule on the screen, 0.001” at the part becomes 1/32” on the screen
*62.5x Magnification = Using a machinists rule on the screen, 0.001” at the part becomes 1/16” on the screen

QL-30

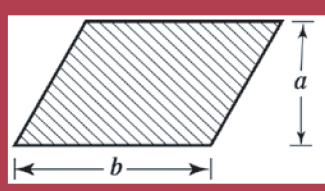
AREAS & DIMENSIONS OF PLANE FIGURES



$$\text{Area} = A = s^2 = \tfrac{1}{2}d^2$$

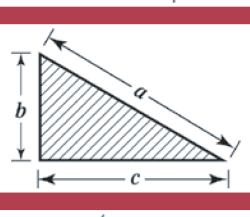


$$\text{Area} = A = ab = a\sqrt{d^2 - a^2} = b\sqrt{d^2 - b^2}$$
$$d = \sqrt{a^2 + b^2}$$
$$a = \sqrt{d^2 - b^2} = A \div b$$
$$a = \sqrt{d^2 - a^2} = A \div a$$

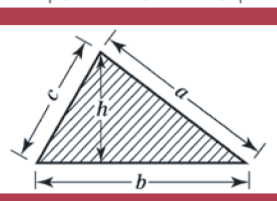


$$\text{Area} = A = ab$$
$$a = A \div b$$
$$b = A \div a$$

Note: The dimension *a* is measured at right angles to line *b*



$$\text{Area} = A = \frac{bc}{2}$$
$$a = \sqrt{b^2 + c^2}$$
$$b = \sqrt{a^2 - c^2}$$
$$c = \sqrt{a^2 - b^2}$$



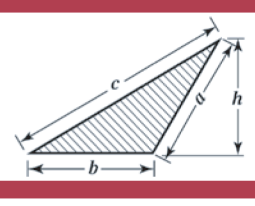
$$\text{Area} = A = \frac{bh}{2} = \frac{b}{2}\sqrt{a^2 - \left(\frac{a^2 + b^2 - c^2}{2b}\right)^2}$$

AEROSPACE

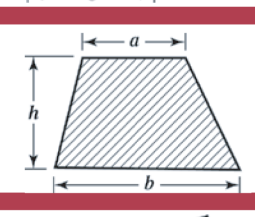
MEDICAL

MANUFACTURING

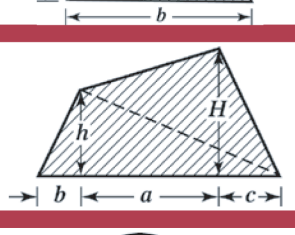
AREAS & DIMENSIONS OF PLANE FIGURES



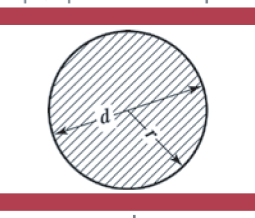
$$\text{Area} = A = \frac{bh}{2} = \frac{b}{2}\sqrt{a^2 - \left(\frac{c^2 - a^2 - b^2}{2b}\right)^2}$$



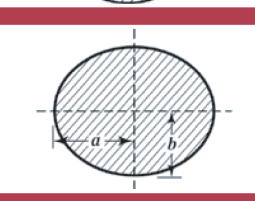
$$\text{Area} = A = \frac{(a + b)h}{2}$$



$$\text{Area} = A = \frac{(H + h)a + bh + cH}{2}$$



$$\text{Area} = A = \pi r^2 = 3.1416r^2 = 0.7854d^2$$
$$\text{Circumference} = C = 2\pi r = 6.832r = 3.1416d$$
$$r = C \div 6.2832 = \sqrt{A \div 3.1416} = 0.564\sqrt{A}$$
$$d = C \div 3.1416 = \sqrt{A \div 0.7854} = 1.128\sqrt{A}$$



$$\text{Area} = A = \pi ab = 3.1416ab$$

An approximate formula for the perimeter is

$$\text{Perimeter} = P = 3.1416\sqrt{2(a^2 + b^2)}$$

A closer approximation is $P = 3.1416\sqrt{2(a^2 + b^2 - \frac{(a - b)^2}{2.2}}$

Metrology Matters is a project of these organizations to provide basic metrology fundamentals to manufacturing.

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