

Ministry of Higher Education and Scientific Research / University of Babylon		Subject: Engineering Drawing
College of Engineering / Al-Musayab		Class: 1 st year
Department of Automobile Engineering		Prepared by :
(1 st Semester) (2019/ 2020)		Dr. Ahmad S. M. Al-Azzawi

Geometric Construction:

15. To draw an arc of given radius to touch two circles one from outside and the other from inside:

1. Assume that the radii of the given circles are 15 and 25 mm, spaced 60 mm apart, and that the radius of arc to touch them is 75 mm.
2. From centre of circle A draw an arc equal to $75 - 25 = 50$ mm.
3. From centre of circle B draw an arc equal to $75 + 15 = 90$ mm.
4. The above arcs intersect at point O. Draw from this origin point a straight line to the centre of circle B which intersect with the circumference of this circle at point C2 and another line from O to the centre of circle A and its extension will intersect with circumference of circle A at point C1.
5. With a radius of 75 mm, draw an arc from point O, reaching points of tangency C1 and C2. This will be the arc touching two circles one from outside and the other from inside.

Note: It is particularly important to note the position of the points of tangency before lining in engineering drawings, so that the exact length of an arc can be established.

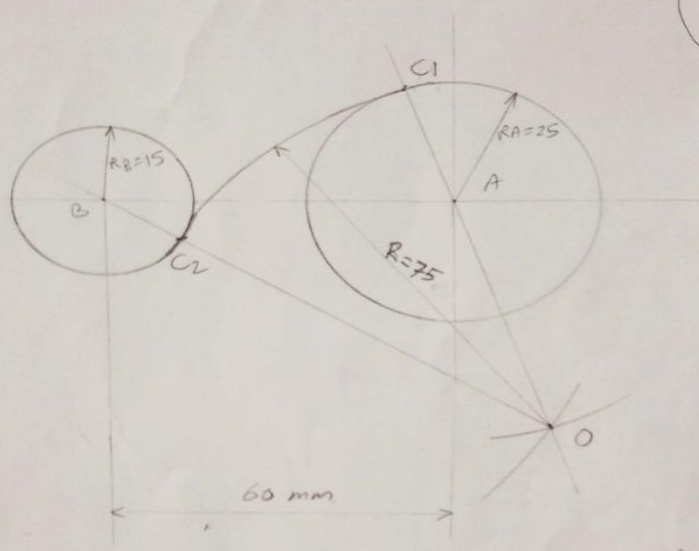
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اعداد: د. احمد سعيد محمد
 كلية هندسة المصنع / جامعة بابل

< العمليات الهندسية

10 رسم قوسين دائريين احدهما من الداخل والاخر من الخارج

كالمعلوم
 $R_A = 25 \text{ mm}$
 $R_B = 15 \text{ mm}$
 $R = 75 \text{ mm}$
 $d = 60 \text{ mm}$



خطوات العمل :

- 1- ترسيم الدائرتين A و B المعلومتين وبجانبه معينة $d = 60 \text{ mm}$.
- 2- في مركز الدائرة A نفتح القوس بفتحة مقدارها $(R - R_A)$ وترسيم قوس الارتفاع.
- 3- في مركز الدائرة B نفتح القوس بفتحة مقدارها $(R + R_B)$ وترسيم قوس الارتفاع في نقطة O.
- 4- نرسم خط مستقيم من النقطة O ويمر بالمركز A ليقطع محيط الدائرة A في النقطة C1.
- 5- نرسم خط مستقيم من النقطة O ويمر بالمركز B ليقطع محيط الدائرة B في النقطة C2.
- 6- نثبت القوس في النقطة O وبنقطة مقدارها R وترسم قوس يصل بين C1 و C2 وهذا يمثل قوس الدائرة A من الخارج والدائرة B من الداخل.

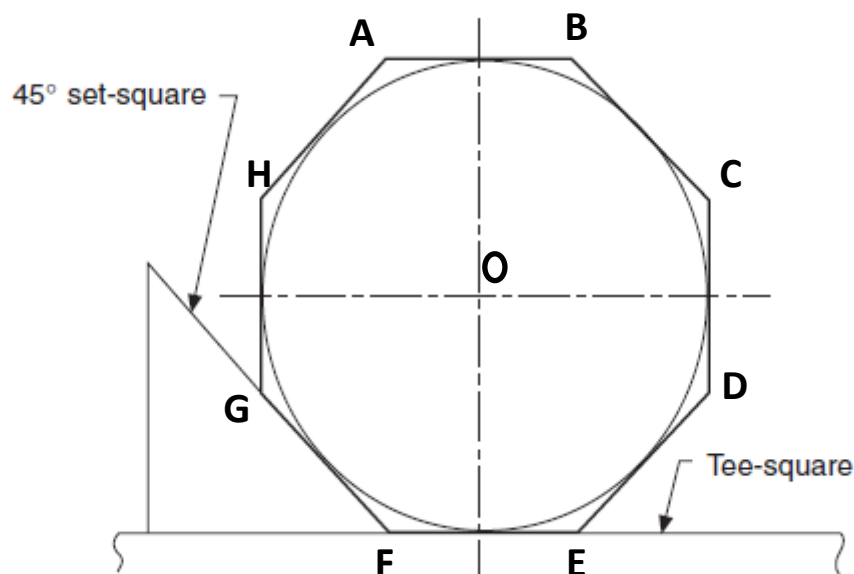
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16. To construct a regular Octagon :(diameter of circle known)

Assume radius (r) = 60 mm

1. Draw orthogonal lines with an angle 90° which represent centre lines of the circle.
2. From the origin point (o) draw a circle using known radius.
3. As showing in figure below using Tee-square and 45o set-square (45o triangle) draw (8) tangential lines to the circle.
4. From intersecting points for the tangential lines through the circumference of the circle join AB,BC,CD,DE,EF,FG,GH and HA to get the required Octagon.

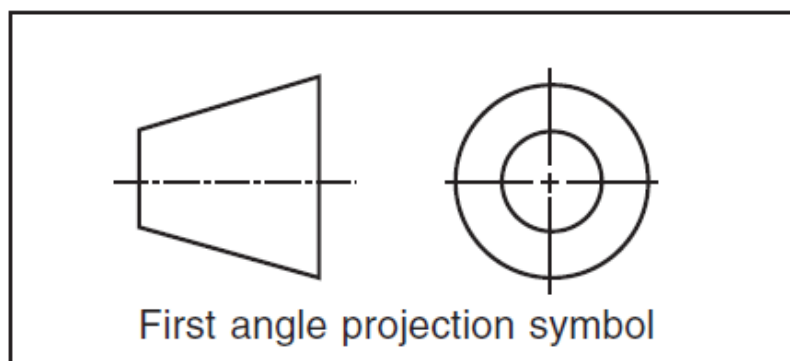
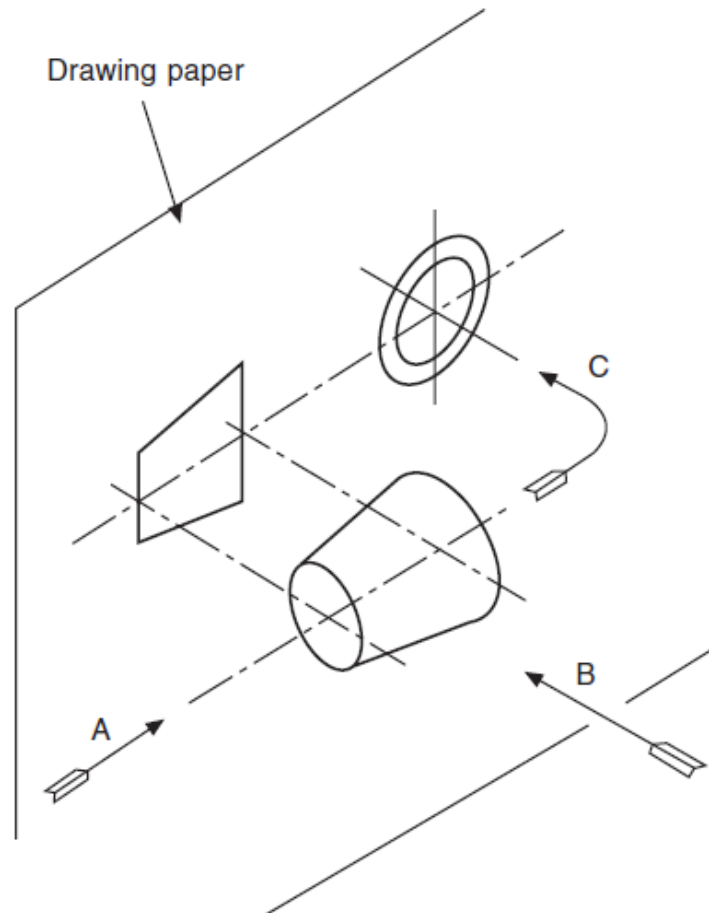
Note: Here we deleted extensions for the tangential lines to be clearer while you can keep them with using construction lines (H-type) and you need to draw Octagon lines using bold lines (B-type).



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Projection System:

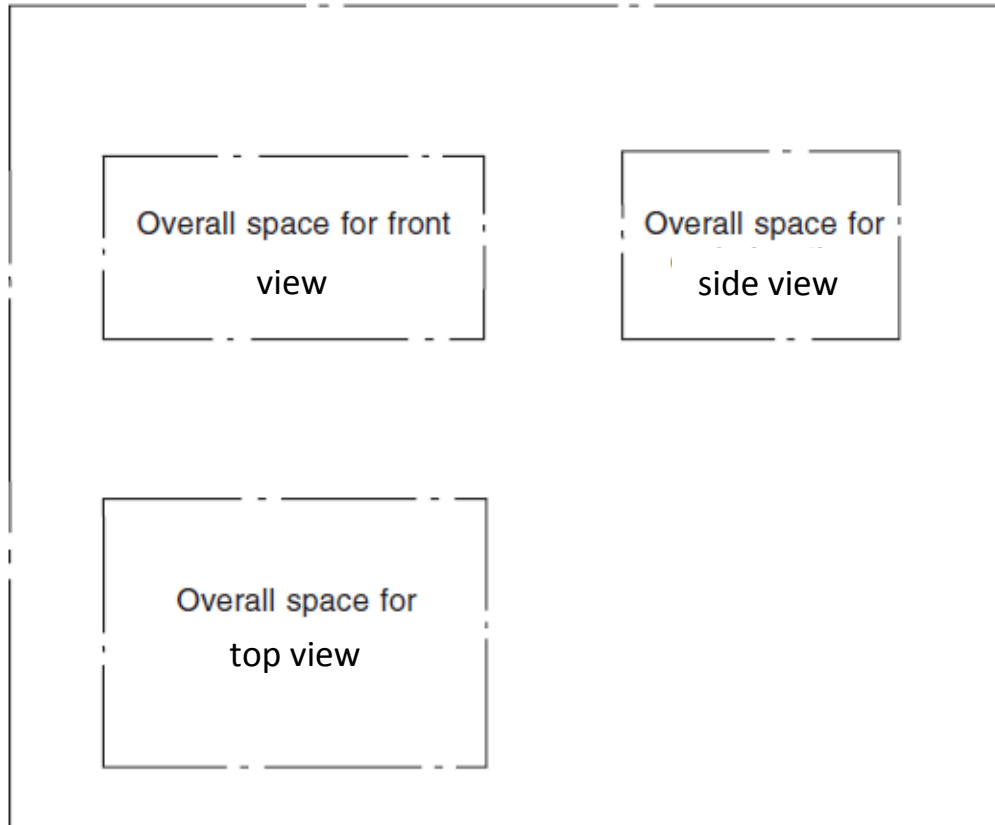
Figure below indicates how to draw projections of a tapered roller using First angle projection system, top view wasn't drawn here because it's exactly same of front view.



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Note: It is usually advantageous to complete one view before starting the others.

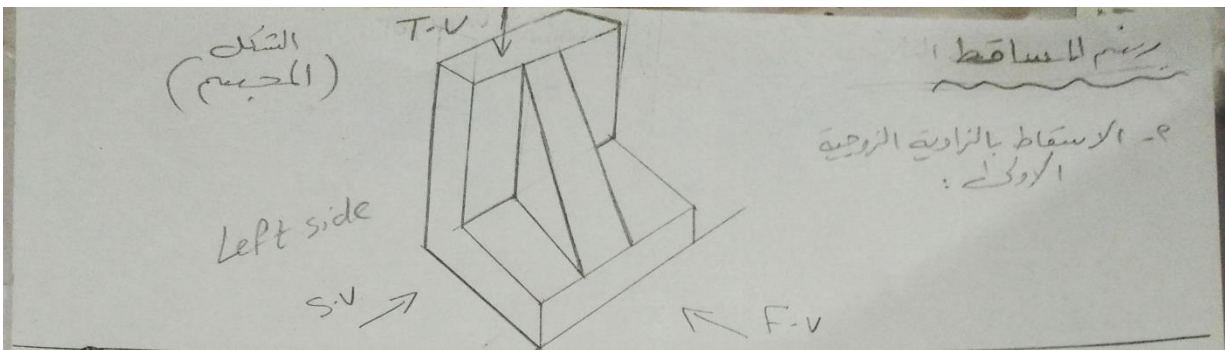
Projections location on drawing paper using 1st angle projection system:



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رسم المساقط
 ٩- الإسقاط بالزاوية الرجعية الأولى

الشكل (المجسم)
 Left side
 T-V
 S-V
 F-V



X
 a
 w₁
 b
 h₁
 F
 S-V
 F-V
 h₂
 T-V
 a
 Y
 F₂

اللوحة
 عنوان
 (المساقط الثلاثة)

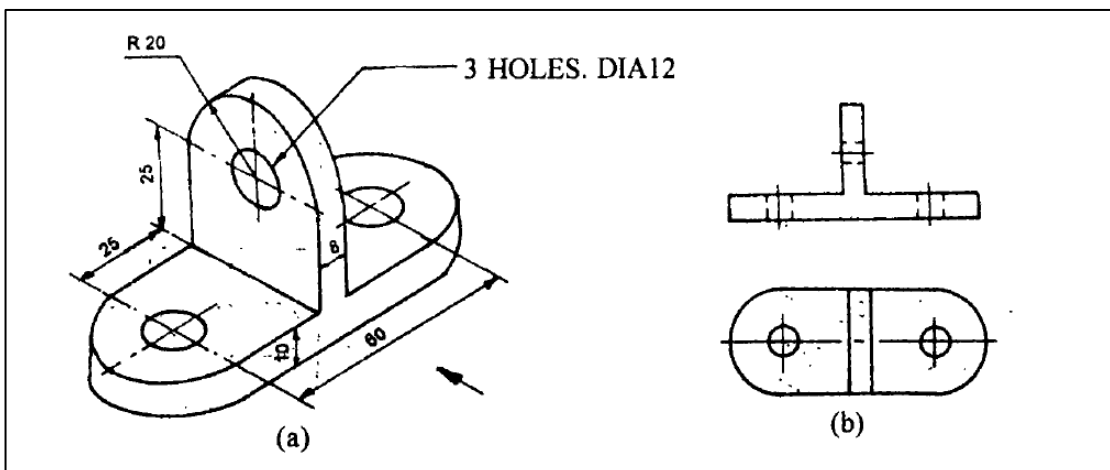
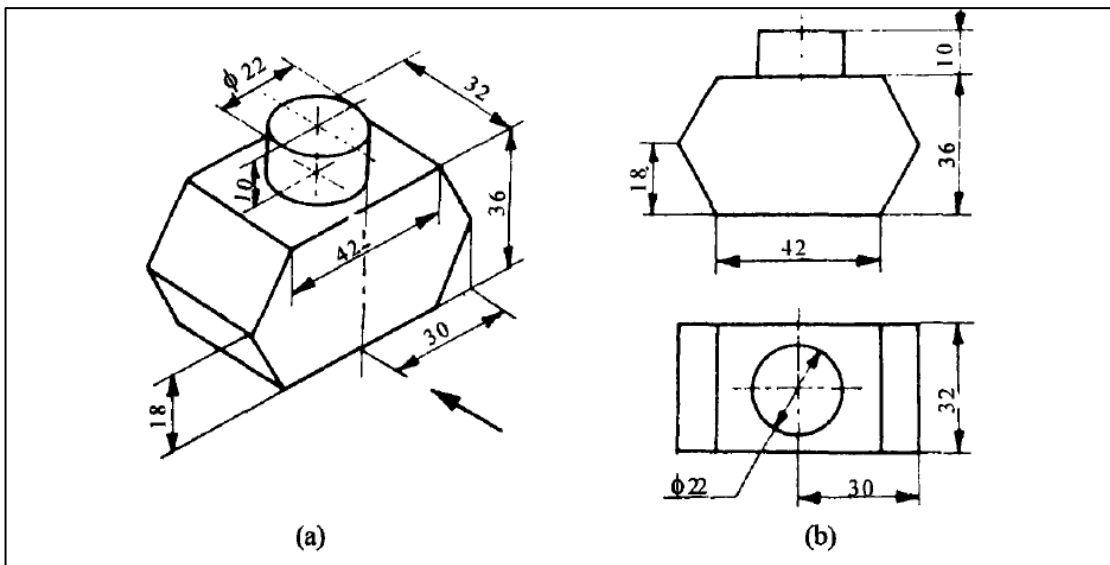
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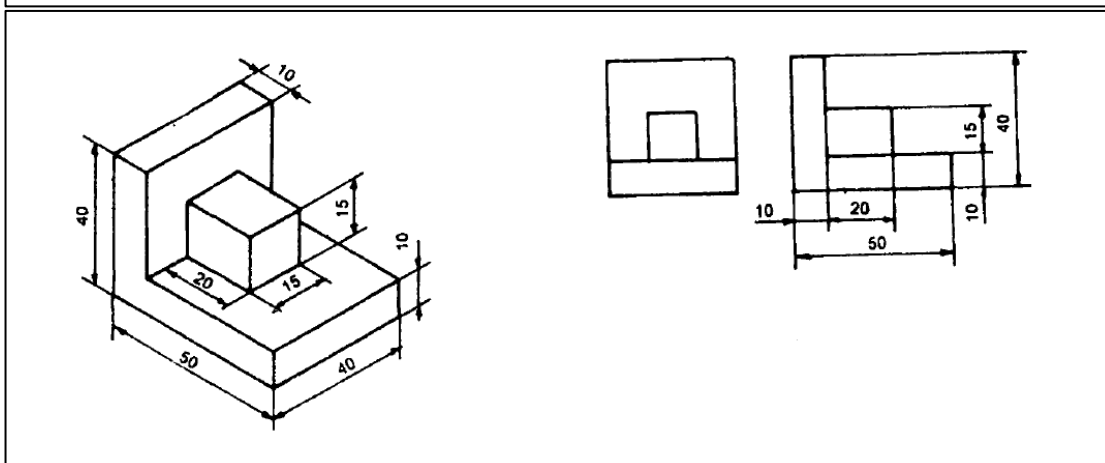
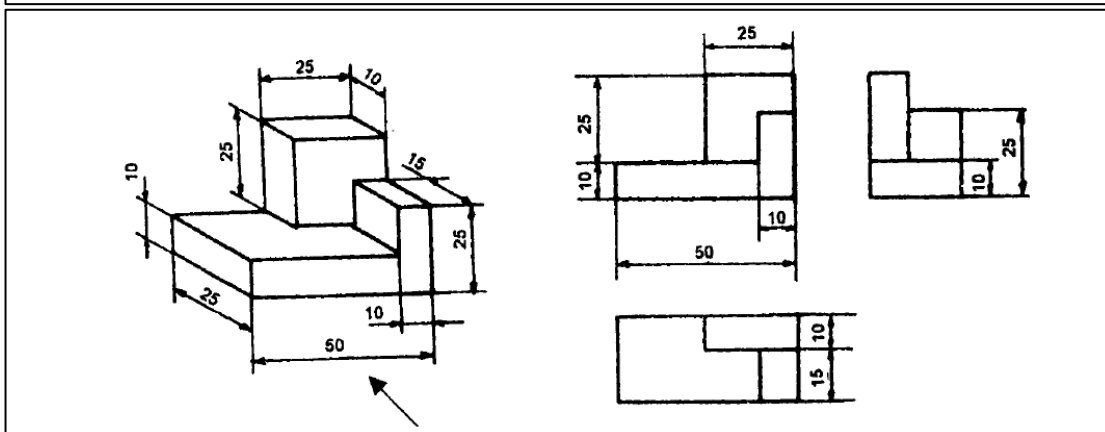
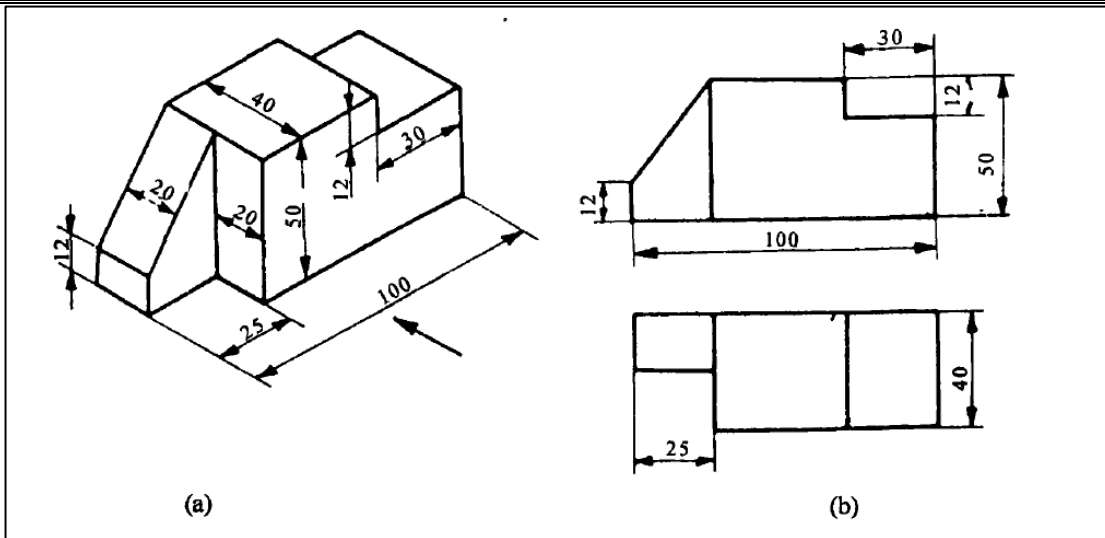
$$a = \frac{X - (w_1 + w_2 + F_1)}{2}$$

$$b = \frac{Y - (h_1 + h_2 + F_2)}{2}$$

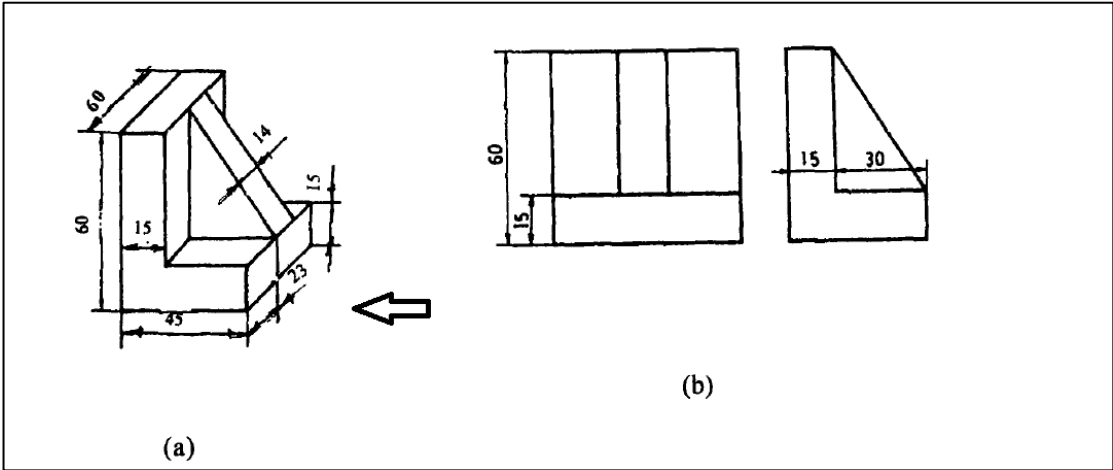
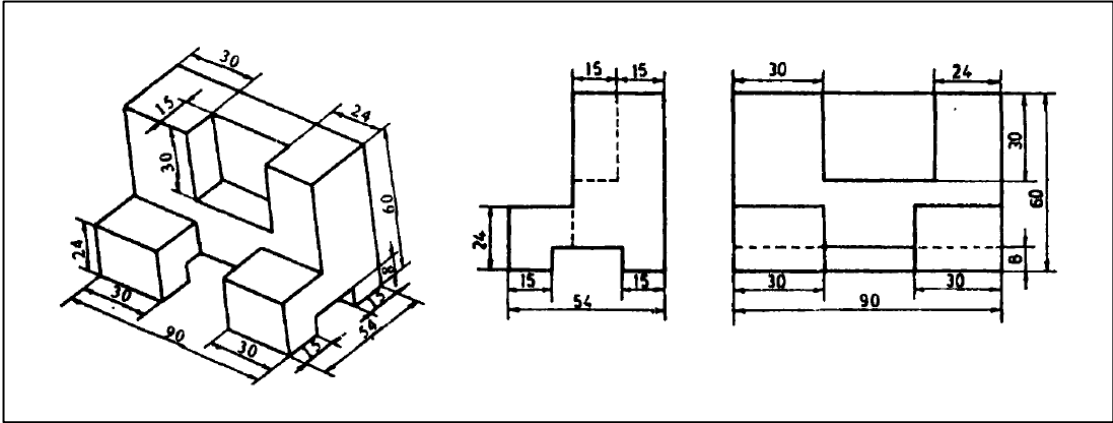
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Solved examples for first angle projection system and method of putting dimensions on drawing:





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