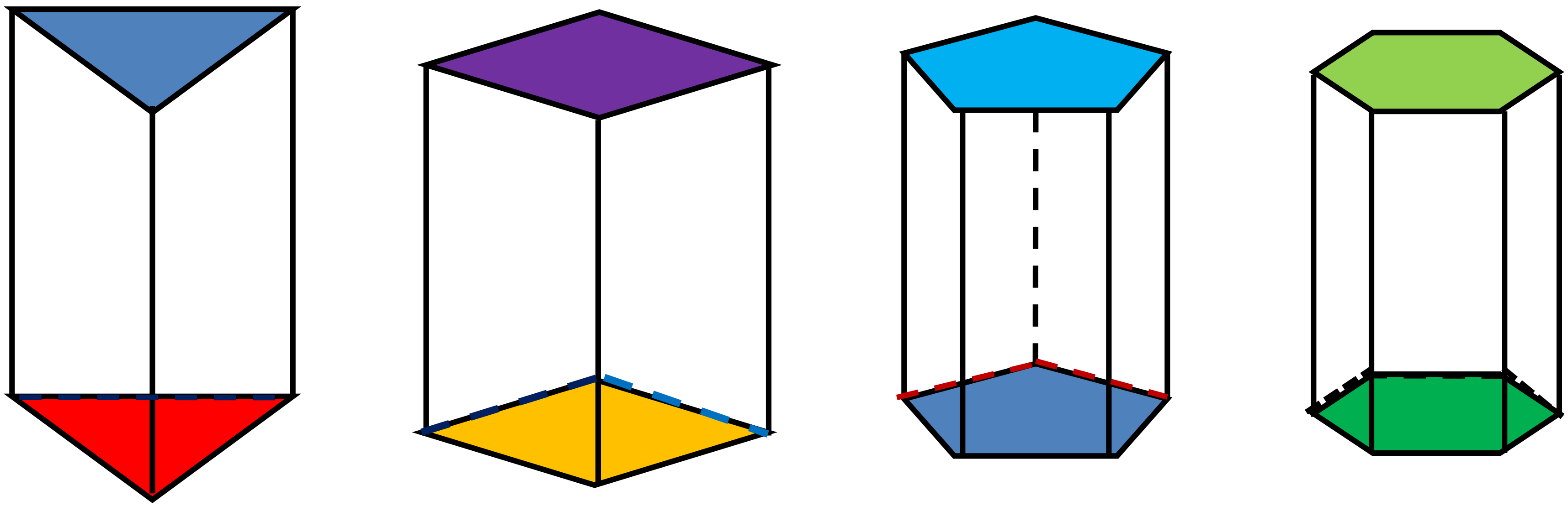
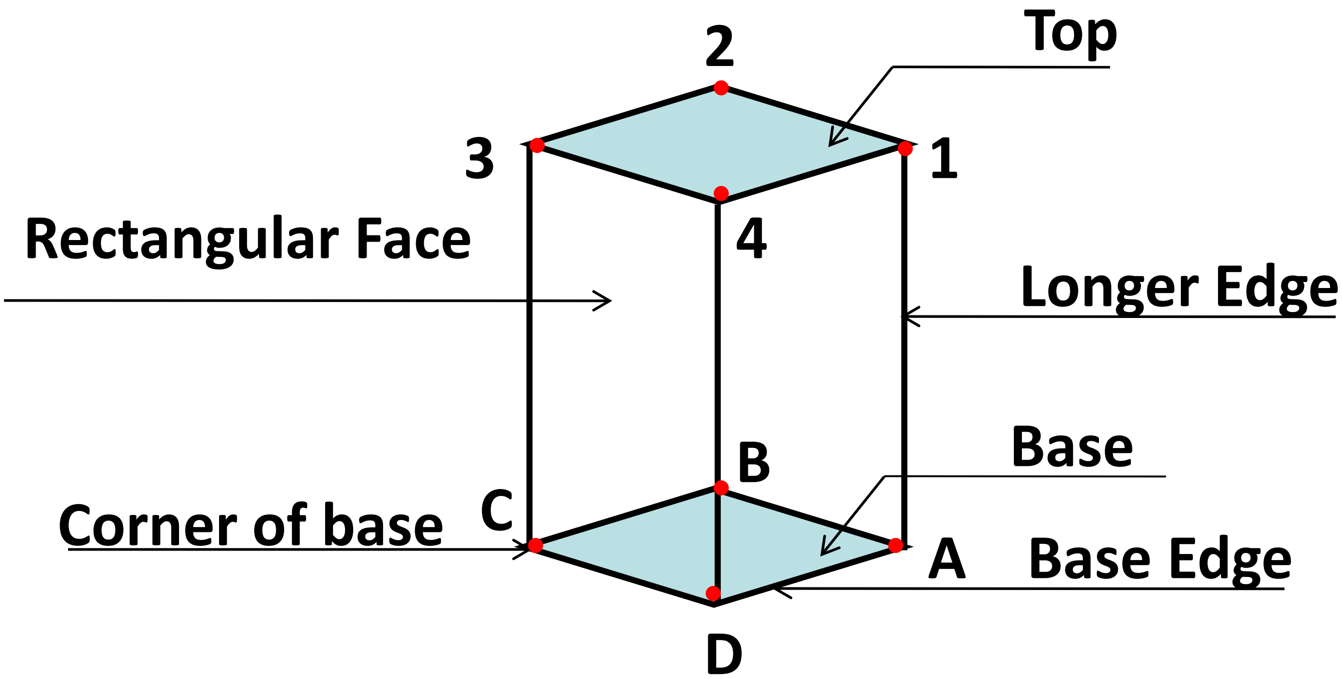
Prisms

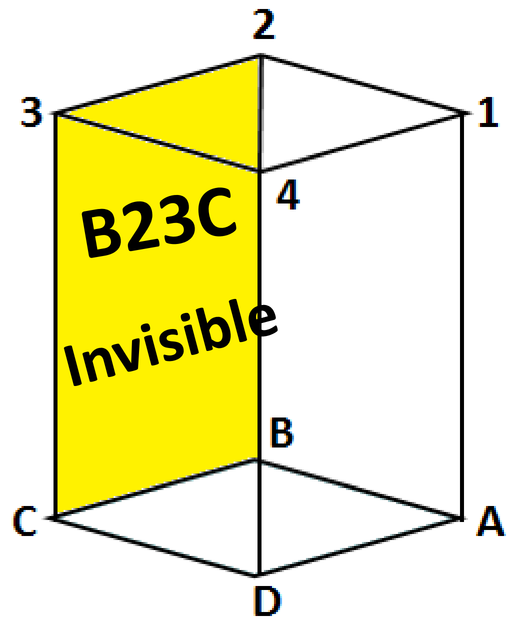


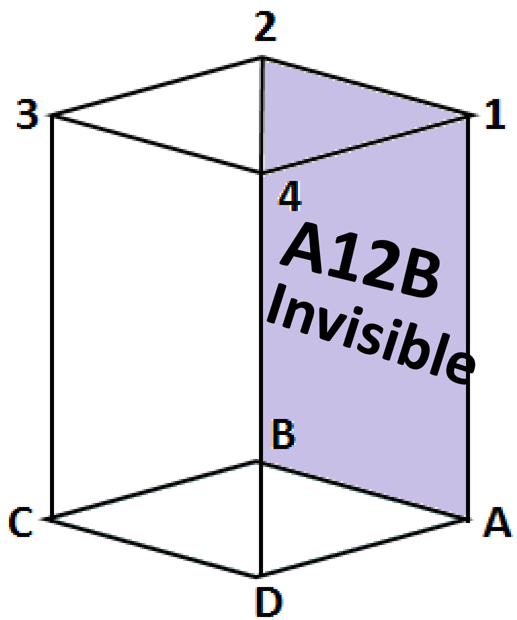
Triangular **Square** **1 Pentagonal** **Hexagonal**

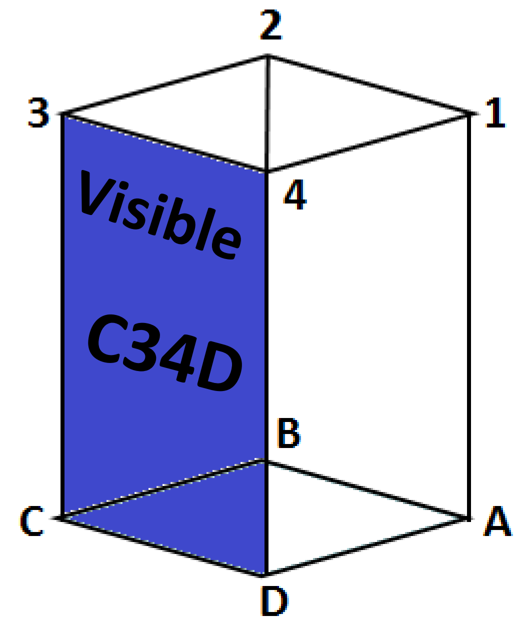
Elements of a square prism

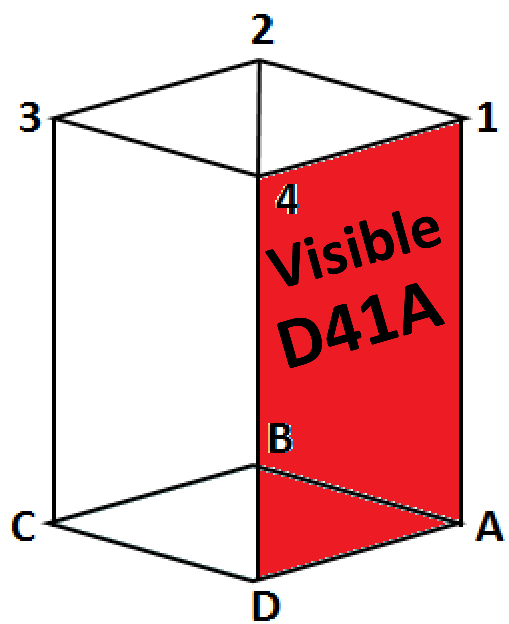


Rectangular Face

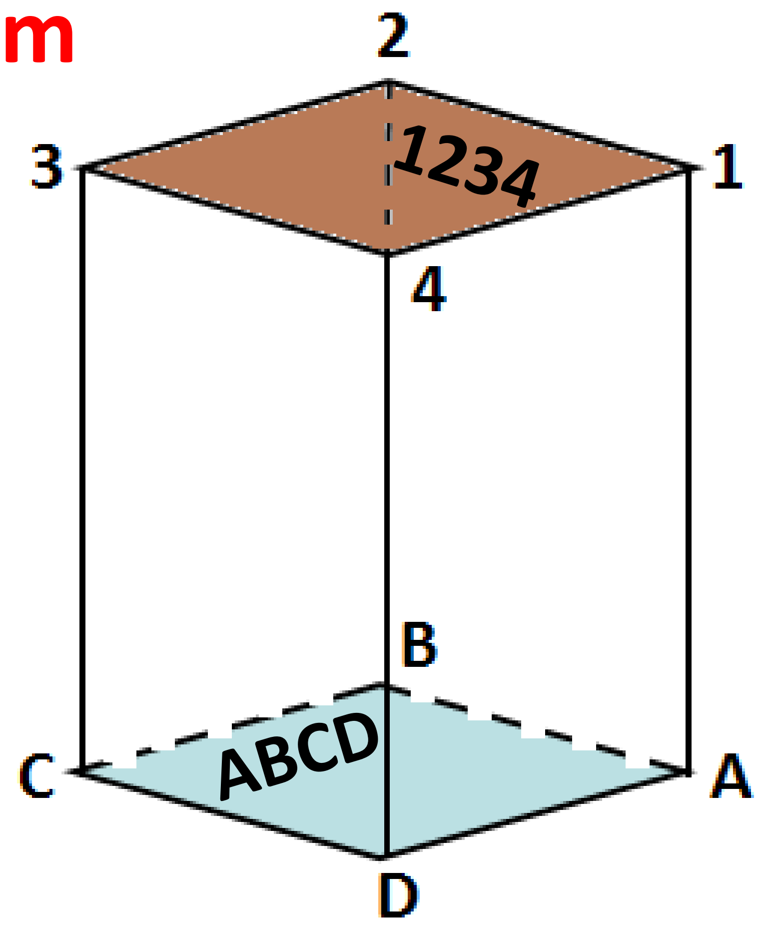








Elements of a square prism



Base: ABCD

Base Edges: AB, BC, CD, DA

Base Corners: A, B, C, D

Top: 1234

Top Edges: 12, 23, 34, 41

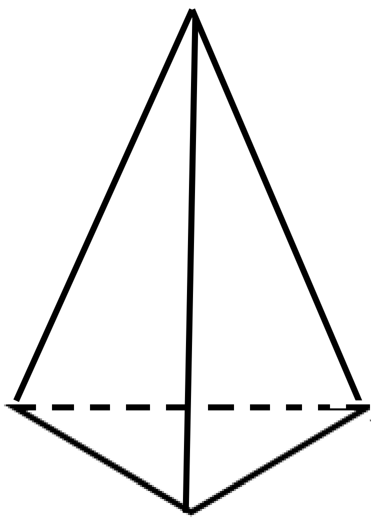
Top Corners: 1, 2, 3, 4

Rectangular Faces:

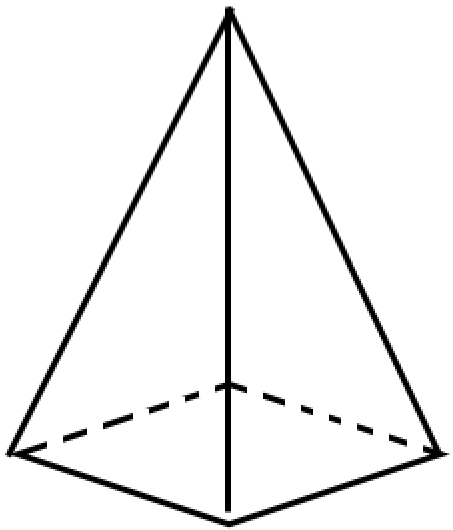
A12B, B23C, C34D, D41A

Longer Edges: A1, B2, C3, D4

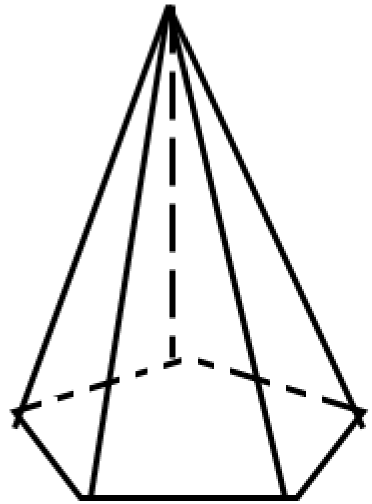
Pyramids



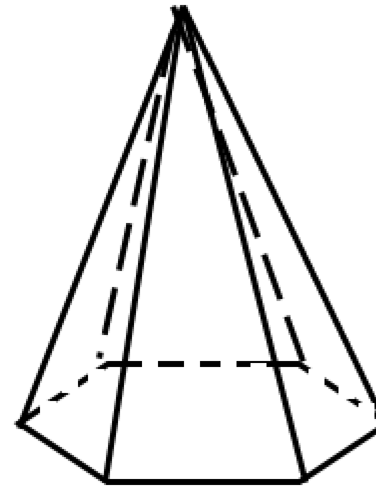
Triangular



Square

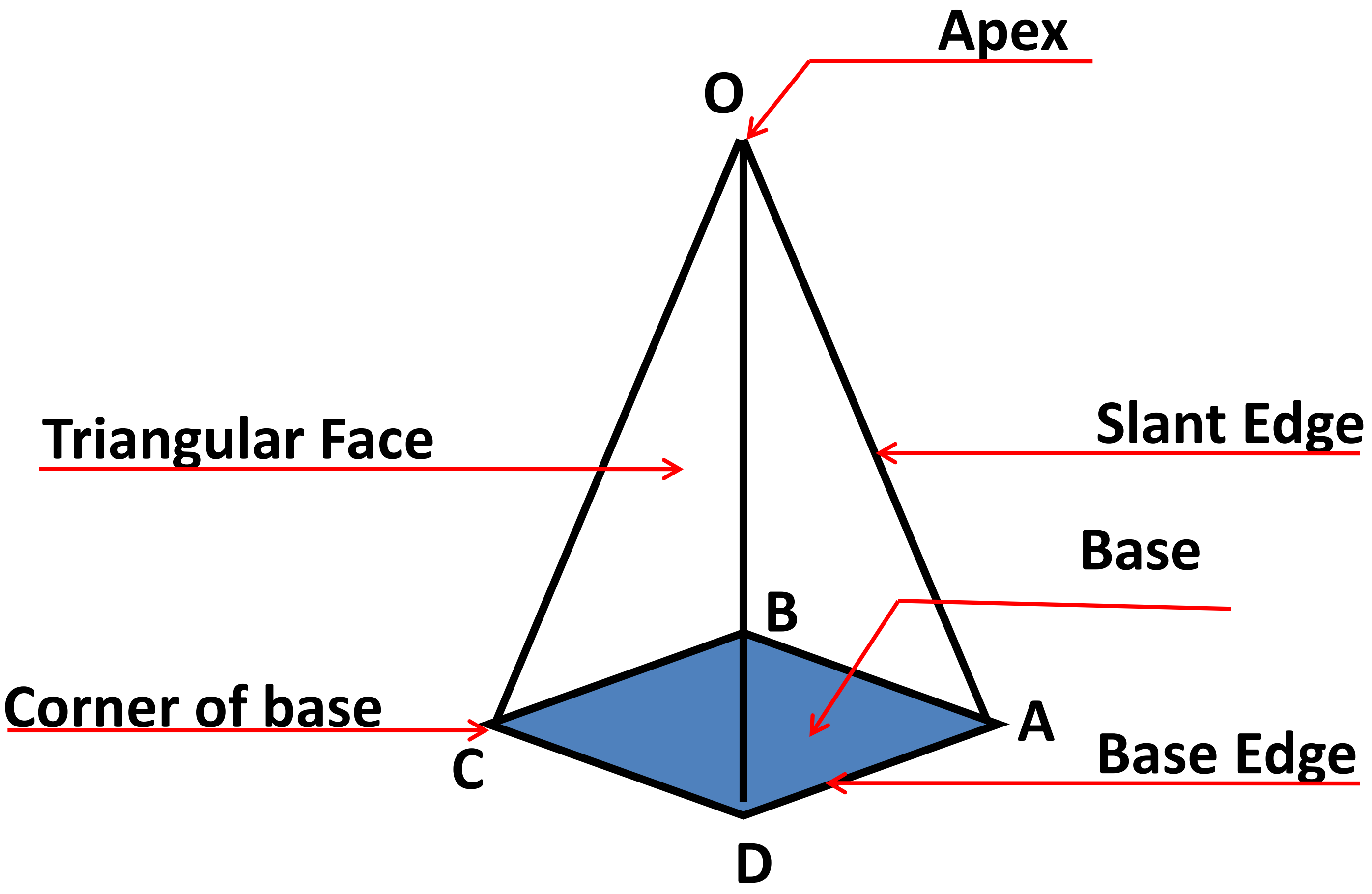


Pentagonal

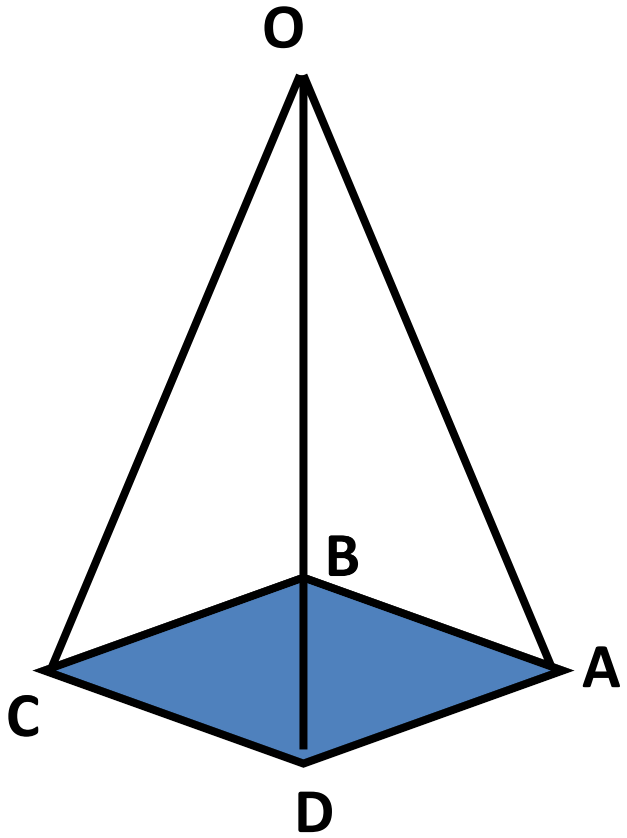


Hexagonal

Elements of a square pyramid



Elements of a square pyramid



Base: ABCD

Base Edges: AB, BC, CD, DA

Base Corners: A, B, C, D

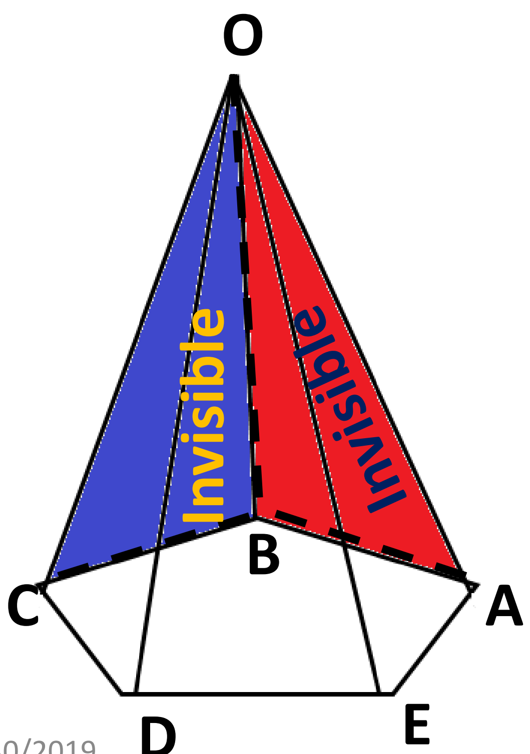
Vertex / Apex: O

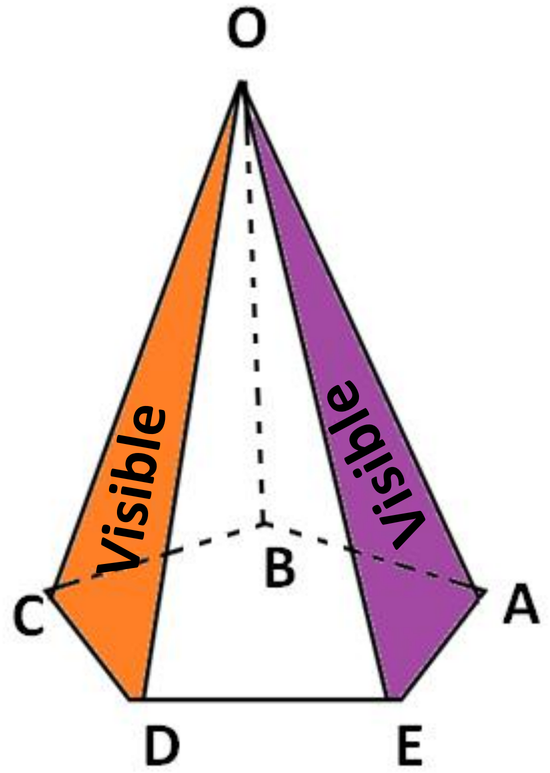
Triangular Faces: OAB,OBC, OCD, ODA

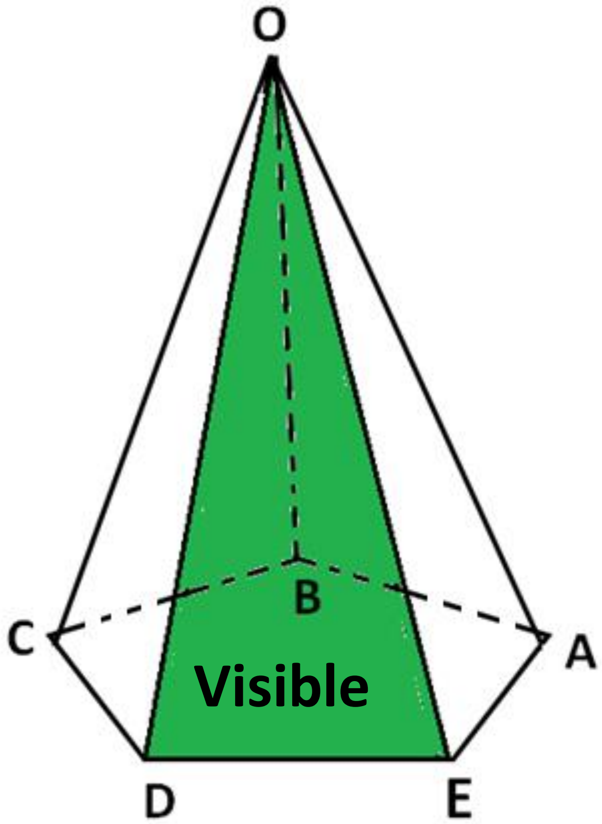
Slant (Slopping) Edges: OA, OB, OC, OD

Pentagonal pyramid

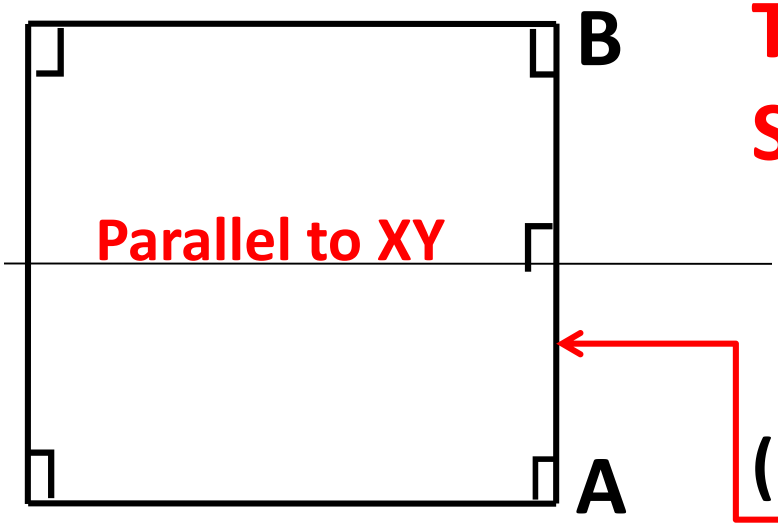
Triangular faces



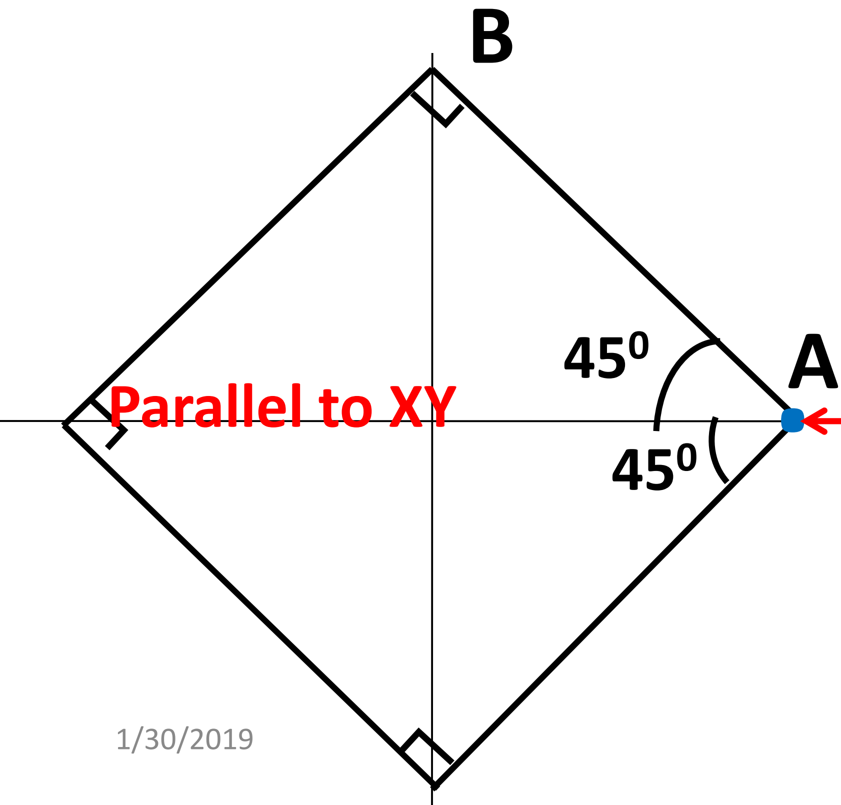




Two important positions of a Square with respect to XY

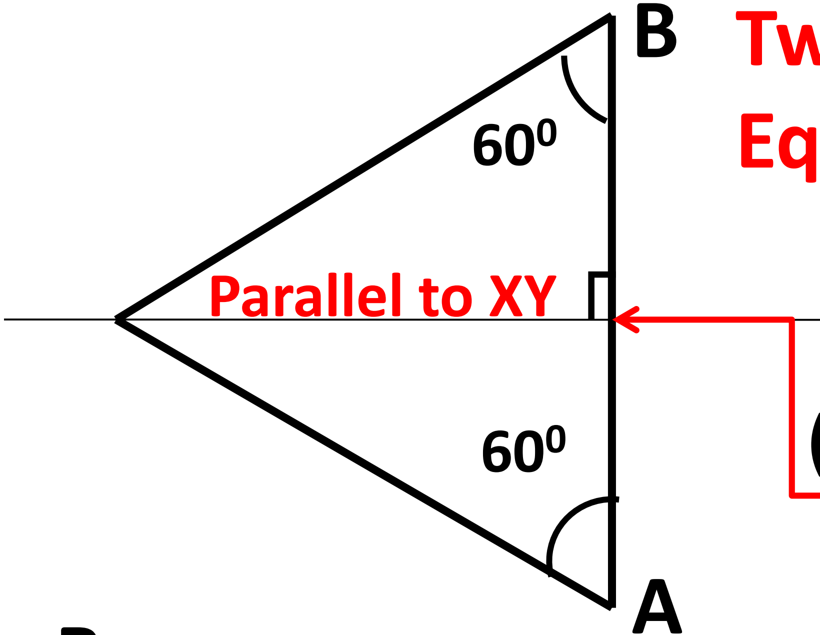


Edge position
(Edge on right side)



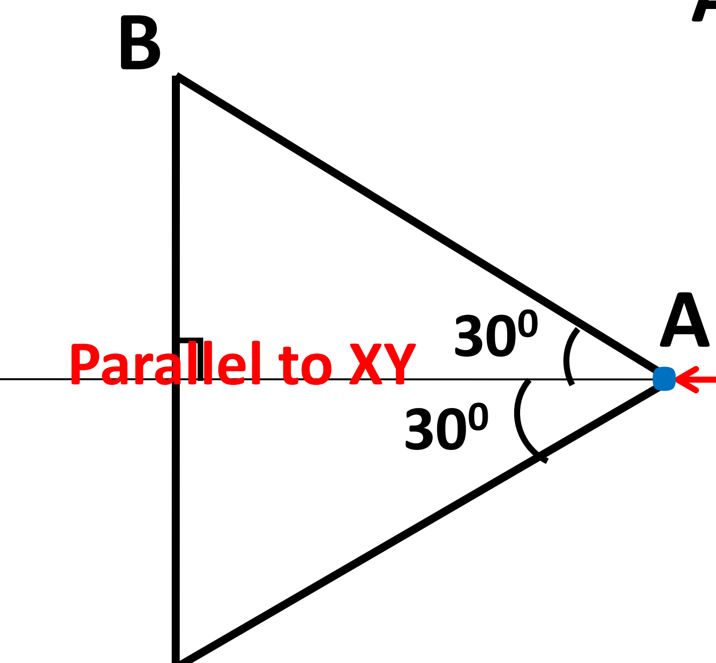
Corner position
(Corner on right side)

Two important positions of an Equilateral Δ w r t XY



Edge position

(Edge on right side)



Corner position

(Corner on right side)

Projections of Solids

Solids are placed first in the simple position and then tilted successively to further stages to obtain the final position.

PROJECTION OF SOLIDS

SOLID IN SIMPLE POSITION

TYPE - 1

Solution in a Single stage

Base on HP.
(Axis perpendicular to HP)

or

Base on VP.
(Axis perpendicular to VP)

PROJECTION OF SOLIDS

TYPE - 2

Solution in Two stages

Axis

Inclined to HP & parallel to VP

or

Axis

Inclined to VP & parallel to HP

PROJECTION OF SOLIDS

TYPE - 3

Solution in Three stages

Axis
Inclined to both HP & VP

SOLID IN SIMPLE POSITION

Single stage:

When base of the solid is on HP.

(When axis of the solid is perpendicular to HP)

Question - 1

A square pyramid, 40 mm base side and axis 70 mm long, is resting on HP on its base. One base edge is inclined 90^0 to VP. Draw the projections of the pyramid.

Analysis:

(1). Single stage solution………………. TV & FV required

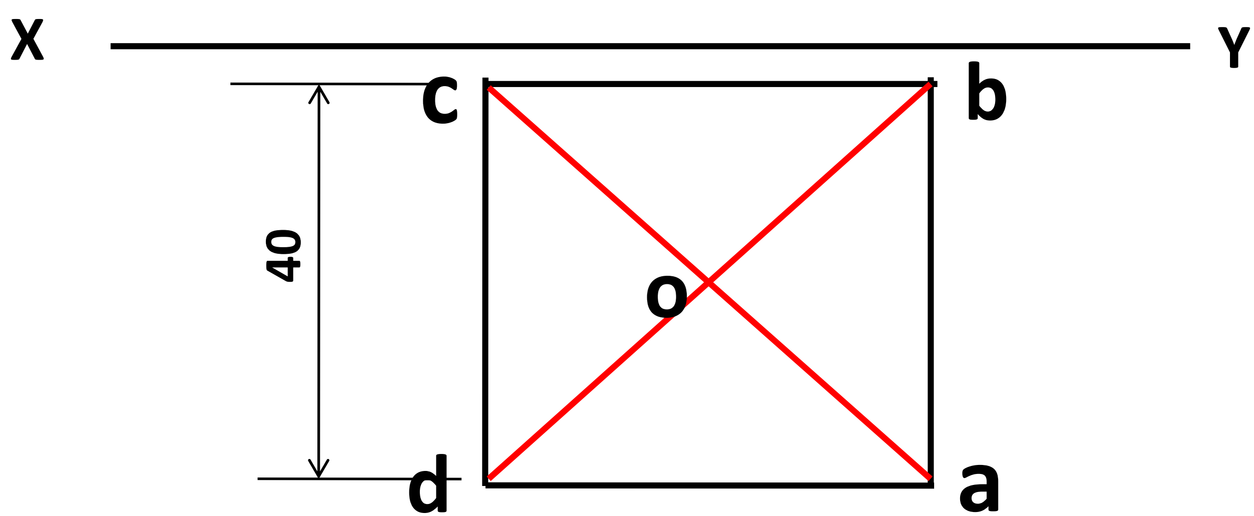
(2). Fig.(1) is TV since, base on HP………. TV below XY

(3). Fig.(1) ………………………… True shape of the base

(4). Given: AB, 90^0 to VP …………………… ab, 90^0 to XY

(5). Complete the TV of the base ………. 40mm Square

(6). Project the slant edges ……………… oa, ob, oc & od



Analysis continued

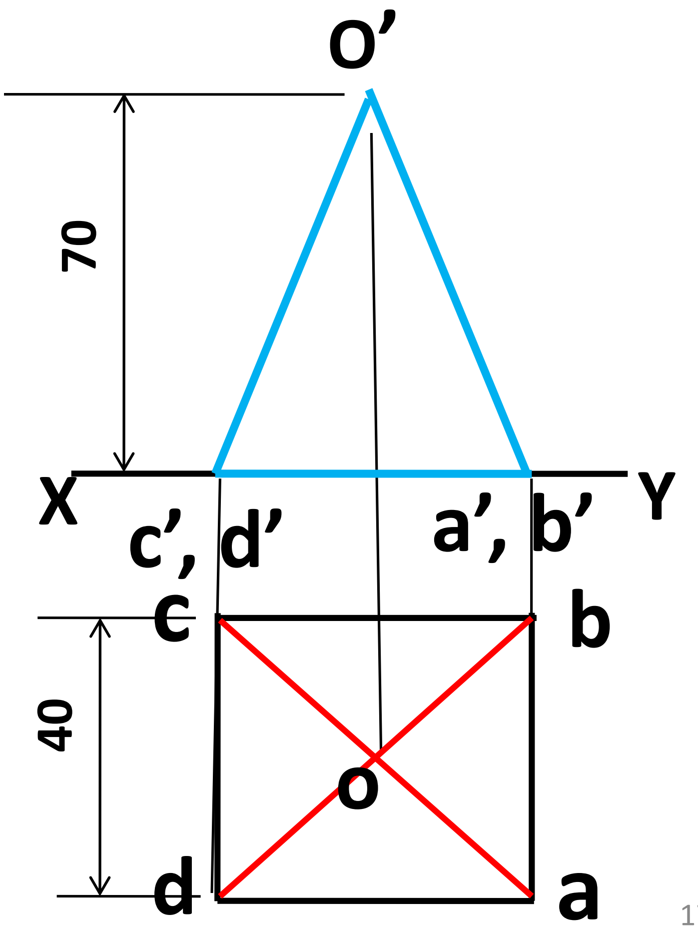
(7). Fig. (2): FV

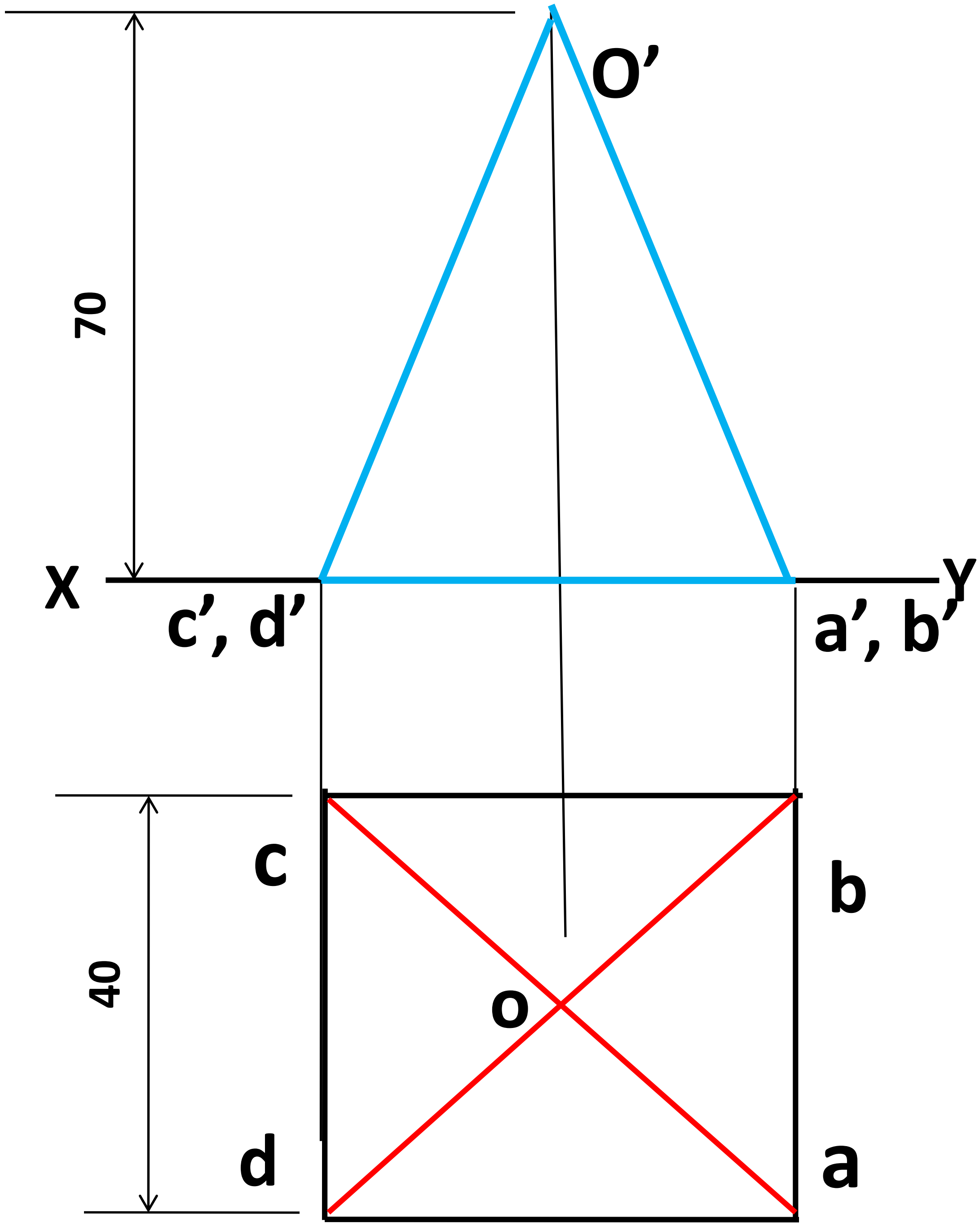
Base on HP ...... a’, b’ c’ & d’ on XY

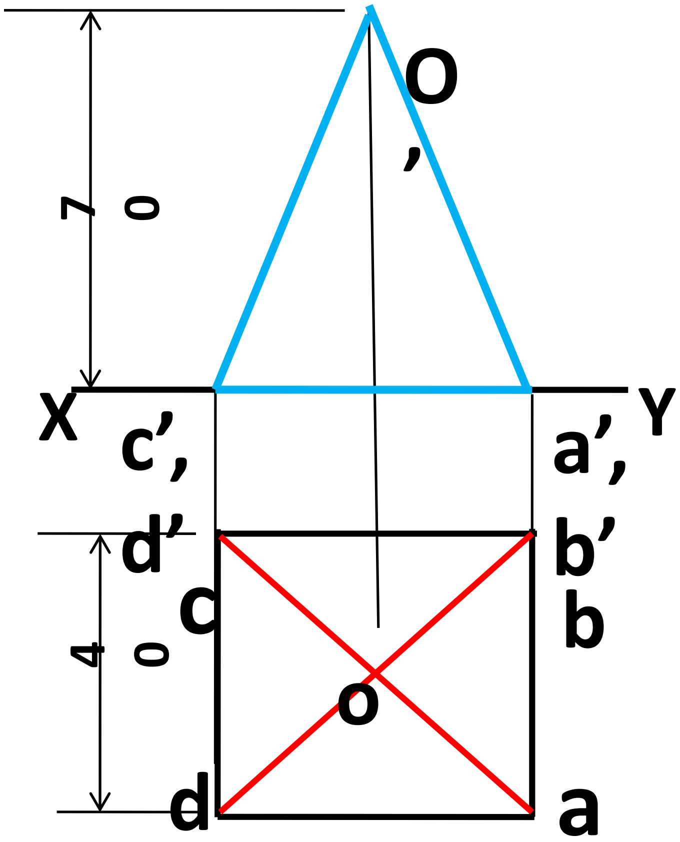
o’, 70 mm. above XY

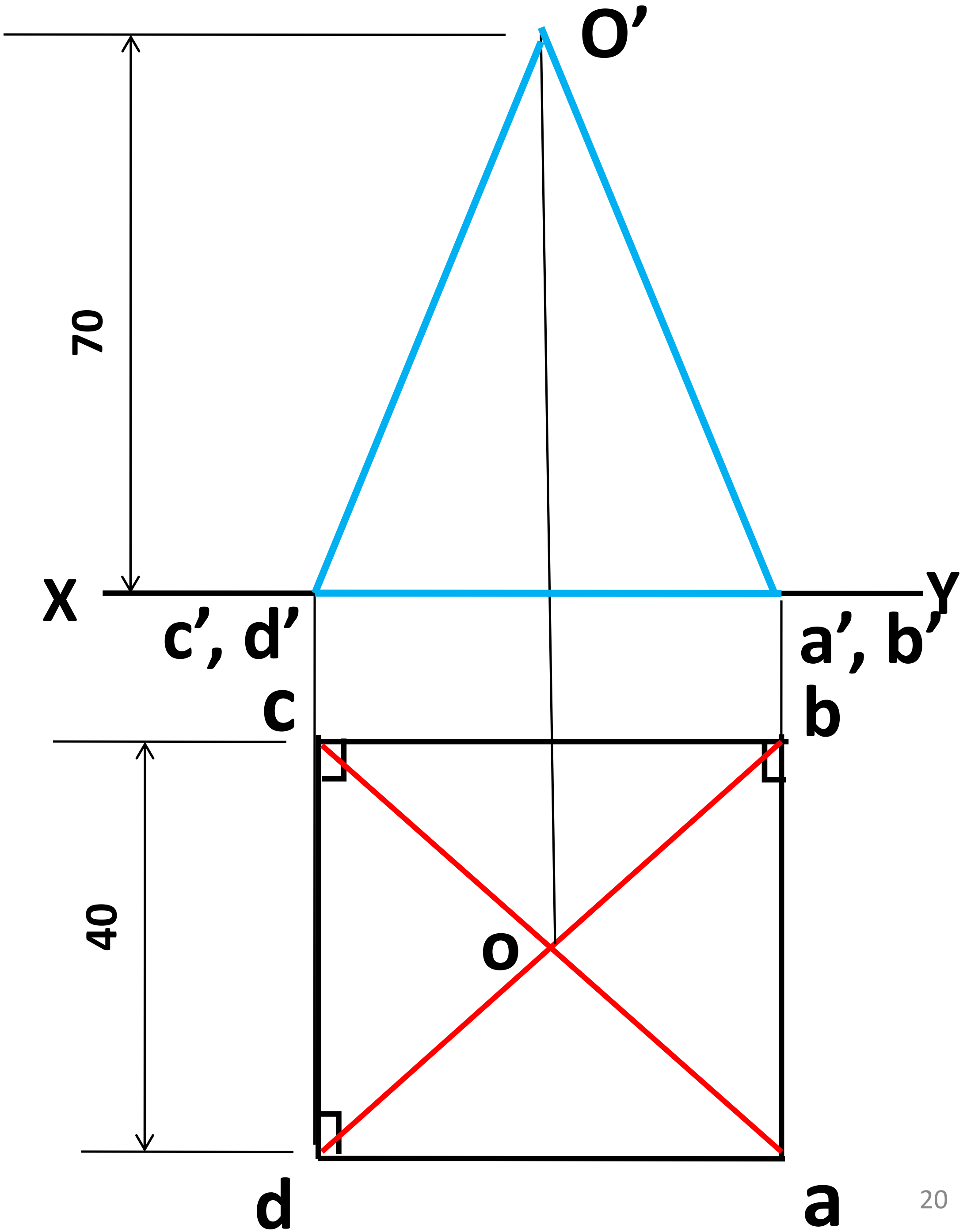
Join o’a’, o’b’, o’c’ & o’d’

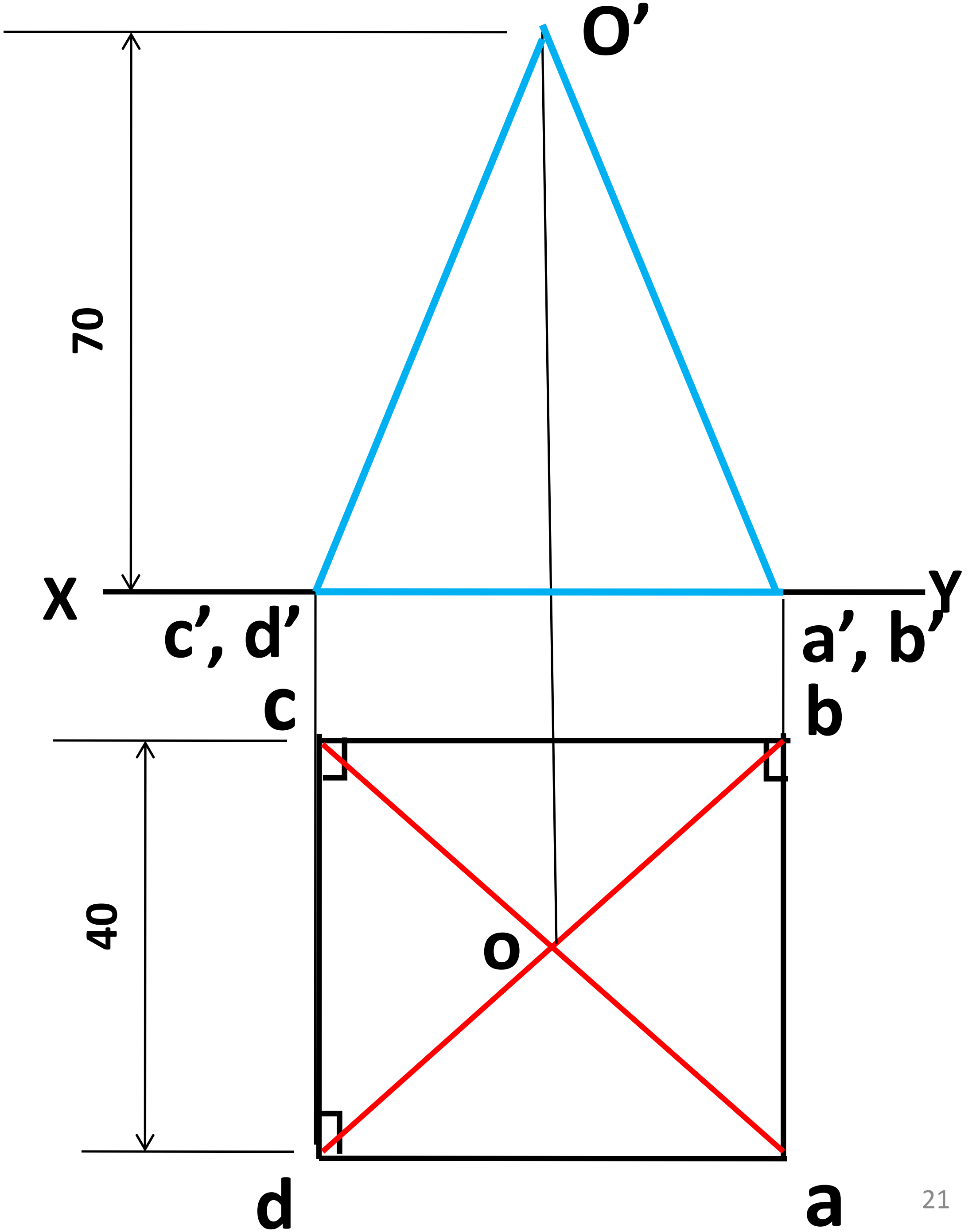
(8). Show all dimensions.




O’
70
X
Y
c’, d’
a’, b’
c
b
40
o
d
a


O
’
7
0
X
Y
c’,
a’,
d’
b’
c
b
4
0
o
d
a


O'
70
X
Y
c', d'
a', b'
c
b
40
o
d
a


O'
70
X
Y
c', d'
a', b'
c
b
40
o
d
a

Analysis continued

(8). **Fig. (2): TV**

Given: Base on VP, hence, TV of the base on XY. (i.e. a, b c & d on XY). Draw projectors through a’, b’, c’ & d’ and fix a, b, c & d on XY. Fix o on the projector through o’ at 70 mm. below XY. Join oa, ob, oc & od.

(9). Show all dimensions.

Single stage

Base on VP
Axis perpendicular to VP

SOLID IN SIMPLE POSITION

Question -2.

A square pyramid, 40 mm base side and axis 70 mm long, is resting on VP on its base. One base edge is inclined 90^0 to HP. Draw the projections of the pyramid.

Analysis:

(1). **Single stage solution.**

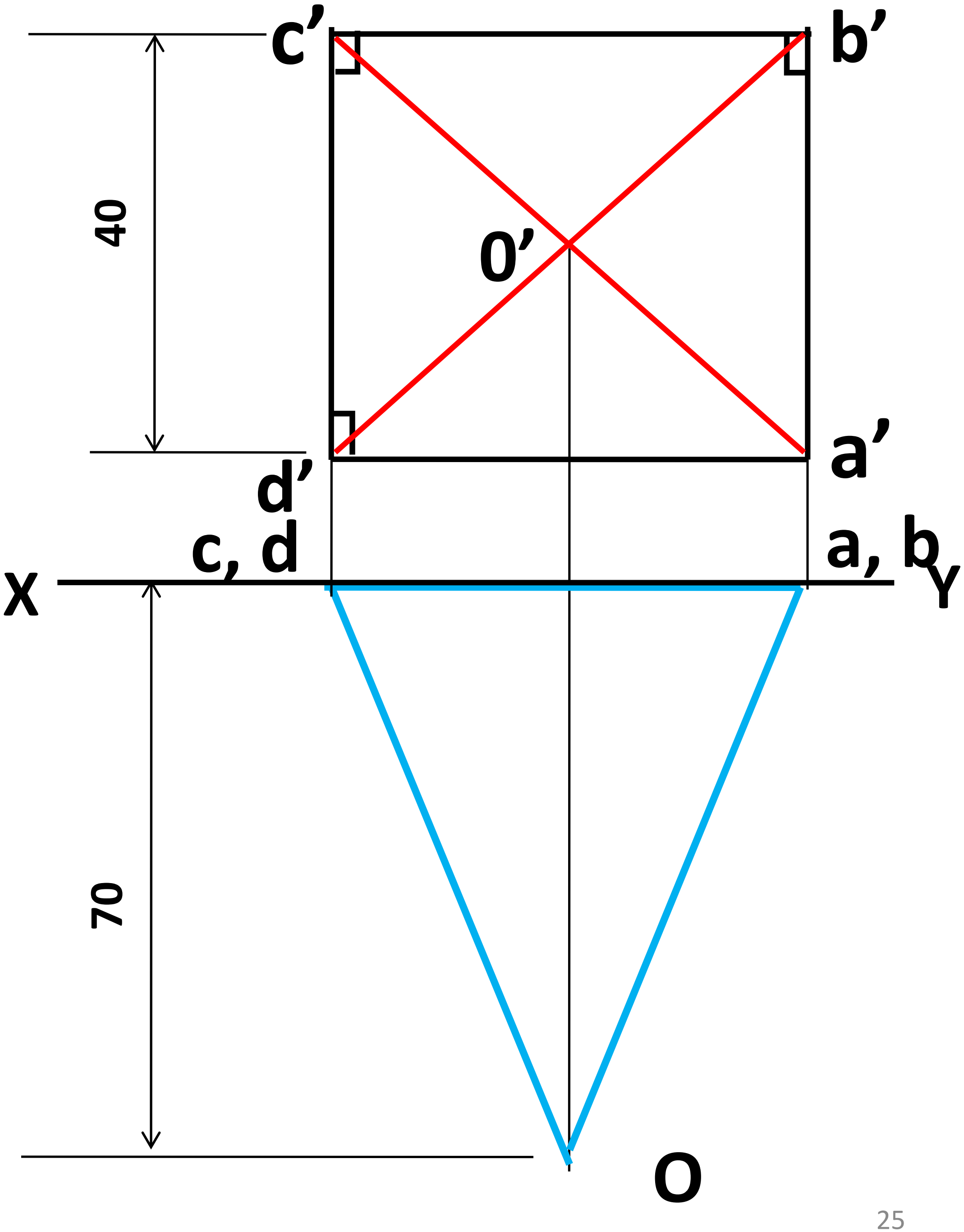
(3). Fig.(1) is FV since, base on VP.

(4). In fig.(1), the base will be projected in its true shape, as the base is on VP.

(5). Given: AB, 90^0 to HP. Hence a'b', 90^0 to XY.

(6). Complete the FV of the base. (It is a square of 40 mm. sides.)

(7). Complete the FV of the pyramid by drawing the FV of the slant edges. (o'a', o'b', o'c' & o'd')


c’
b’
40
0’
a’
d’
c, d
a, b
X
Y
70
O

Question - 3

A square pyramid 40 mm side of base and axis 70 mm long is resting on HP on one of its base edges. Axis is inclined 30^0 to HP. The top view of the axis makes 45^0 to XY line. Draw projections of the pyramid. Vertex of the pyramid is nearer to VP.

Square pyramid	One Base edge on HP	Axis inclined to HP. (θ given)	TV of Axis inclined to XY. (β given)	Vertex nearer to VP

(1).AB on HP.

(2). Axis inclined to HP.

(3). TV of axis inclined to XY.

Note

The given angle is β, & hence axis is inclined to VP by an unknown angle ϕ.

No of stages → **Three ……… from(2) & (3).**

Q3.

Fig(1). – TV – Base in true shape – (a b) ⊥ to XY

TV of slant edges

Fig(2). – FV – a', b', c' & d' on XY

Fig(3). – FV – position w r t HP.

a', b' on XY & ϴ (axis) = 30^0 to XY

Fig(2) & Fig(3) are of same shape

Fig(4). – TV – Show all lines in the solid. (visible/invisible)

Fig(5). – TV – position w r t VP –*β(axis) = 45^0 &*

***o_1 nearer to XY* - copy paste Fig(4).**

Fig(6). – FV – Show all lines in the solid. (visible/invisible)

Stage – 1 (Preparation stage)

Solid in Simple position

Fig (1) – CV – TV (Plan) - in Base Edge Position

.... from(1)

Stage – 1

Fig (2) – FV – To be projected from fig(1).

Stage – 2

For the Second position of the solid.

(Axis inclined to HP)

Fig (3) – **By changing the position of fig(2).**

Fig (2) being a FV; Fig (3) is also a FV.

FV to account conditions with HP.

Given conditions with HP:

(1).AB on HP. ⟶ a’ & b’ on XY as a single point.

(2).Axis inclined to HP. ⟶ FV of axis inclined to XY.

Remember

True angle with True length only.

Stage – 2

Fig (4) – TV of the solid in its Second position.

Verticals from fig (3) & Horizontals from fig (1).

- **Locate the new plan points.**
- **Name them by adding subscript ($_1$)**
- **Connect the boundary points by straight lines.**

Visible and Invisible lines in fig (4).

All outer edges of the fig. are visible.

They should be solid lines.

Visibility of other lines in fig (4).

Assume the observer to be above the solid

in its Second position, i.e. above fig (3).

CASE - 1

Base end is nearer to observer

All base edges of fig (4) are visible.

Hence to be solid lines.

CASE - 2

Base end is farther from observer

Base edges not in the boundary

of fig (4) are invisible.

Hence to be dashed lines.

Line Crossing

Line crossing a Dashed line is a Solid line.

Line crossing a Solid line is a Dashed line.

Junctions inside the fig.

Such a Junction will contain

- **Either only Solid lines.**
- **Or only Dashed lines.**

Stage – 3

For the Third position of the solid.

(Axis inclined to VP)

Fig (5) – By changing the position of fig(4).

Fig (4) being a TV; Fig (5) is also a TV.

TV to account conditions with VP.

Given position with VP:

(1). TV of Axis inclined to XY.

(2). Vertex nearer to VP.

Remember

Apparent angle with Apparent length

Stage – 3

Fig (6) – FV of the solid in its Third position.

Verticals from fig (5) & Horizontals from fig (3).

Locate the new elevation points.

Name them by adding superscript (’)

Connect the boundary points by straight lines.

Visible and Invisible lines in fig (6).

All outer edges of the fig. are visible.
They should be solid lines.

Visibility of other lines in fig (6).

Assume the observer to be in front of the solid in its Third position, i.e. below fig (5).

CASE - 1

Base end nearer to observer

All base edges of fig (6) are visible.

Hence to be solid lines.

CASE - 2

Base end farther from observer

Base edges not in the boundary

of fig (6) are invisible.

Hence to be dashed lines.

Question - 4

A square pyramid 40 mm side of base and axis 70 mm long is resting on HP on one of its base edges. Axis is inclined 30^0 to HP and 45^0 to VP. Draw projections of the pyramid. Vertex of the pyramid is nearer to VP.

Square pyramid	**One Base edge on HP**	**Axis inclined to HP. (θ given)**	**Axis inclined to HP. (ϕ given)**	**Vertex nearer to VP**

Q4.

Fig(1). – TV – Base in true shape – (a b) ⊥ to XY

TV of slant edges

Fig(2). – FV – a', b', c' & d' on XY

Fig(3). – FV – position w r t HP.

a', b' on XY & ϴ (axis) = 30⁰ to XY

Fig(2) & Fig(3) are of same shape

Fig(4). – TV – Show all lines in the solid. (visible/invisible)

Fig(5). – TV – position w r t VP –*given, φ (axis) = 45⁰ ;*

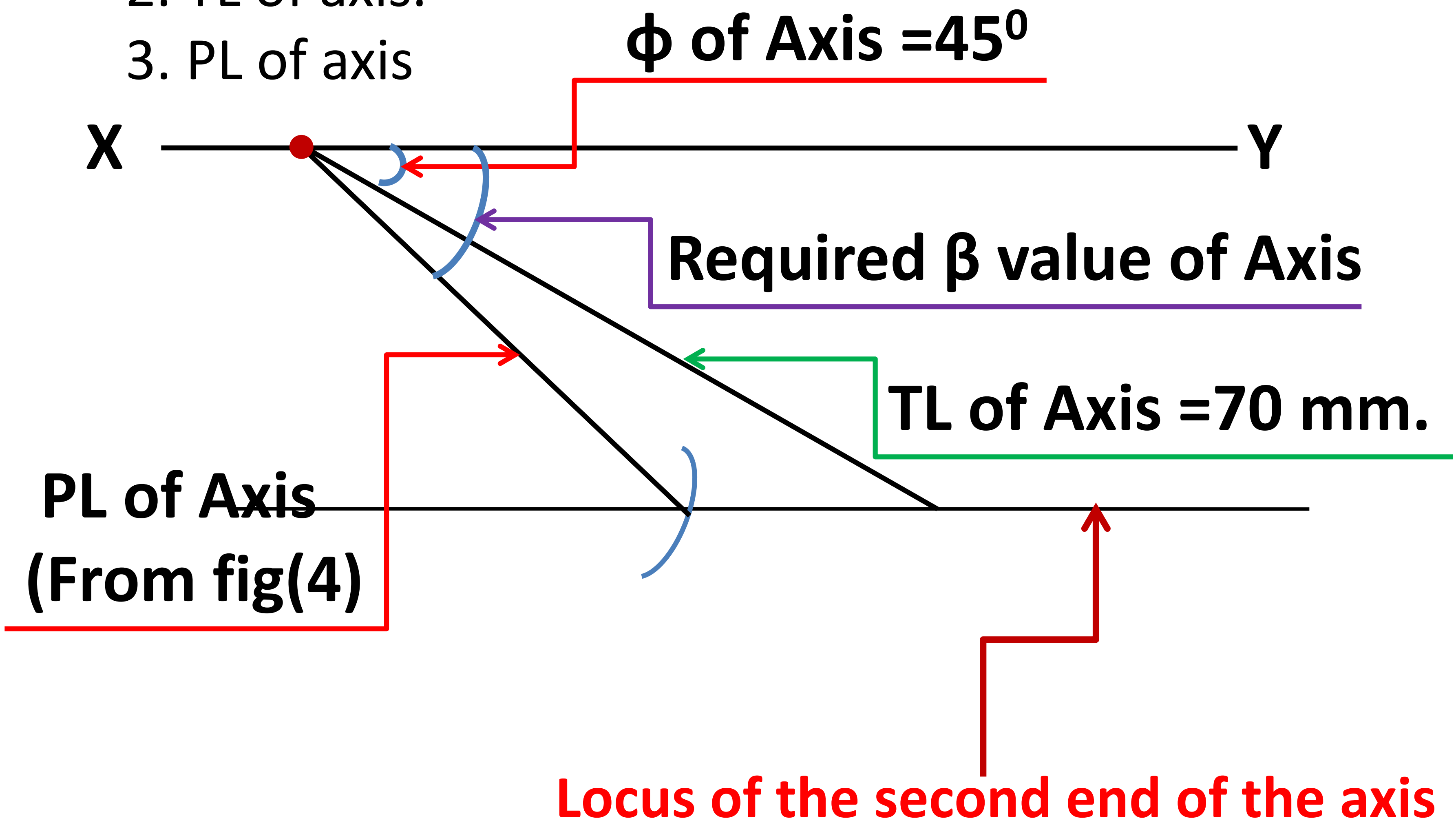
obtain β (axis), since, in fig(4) axis not in True Length.

Also keep o_1 nearer to XY. **- copy paste Fig(4).**

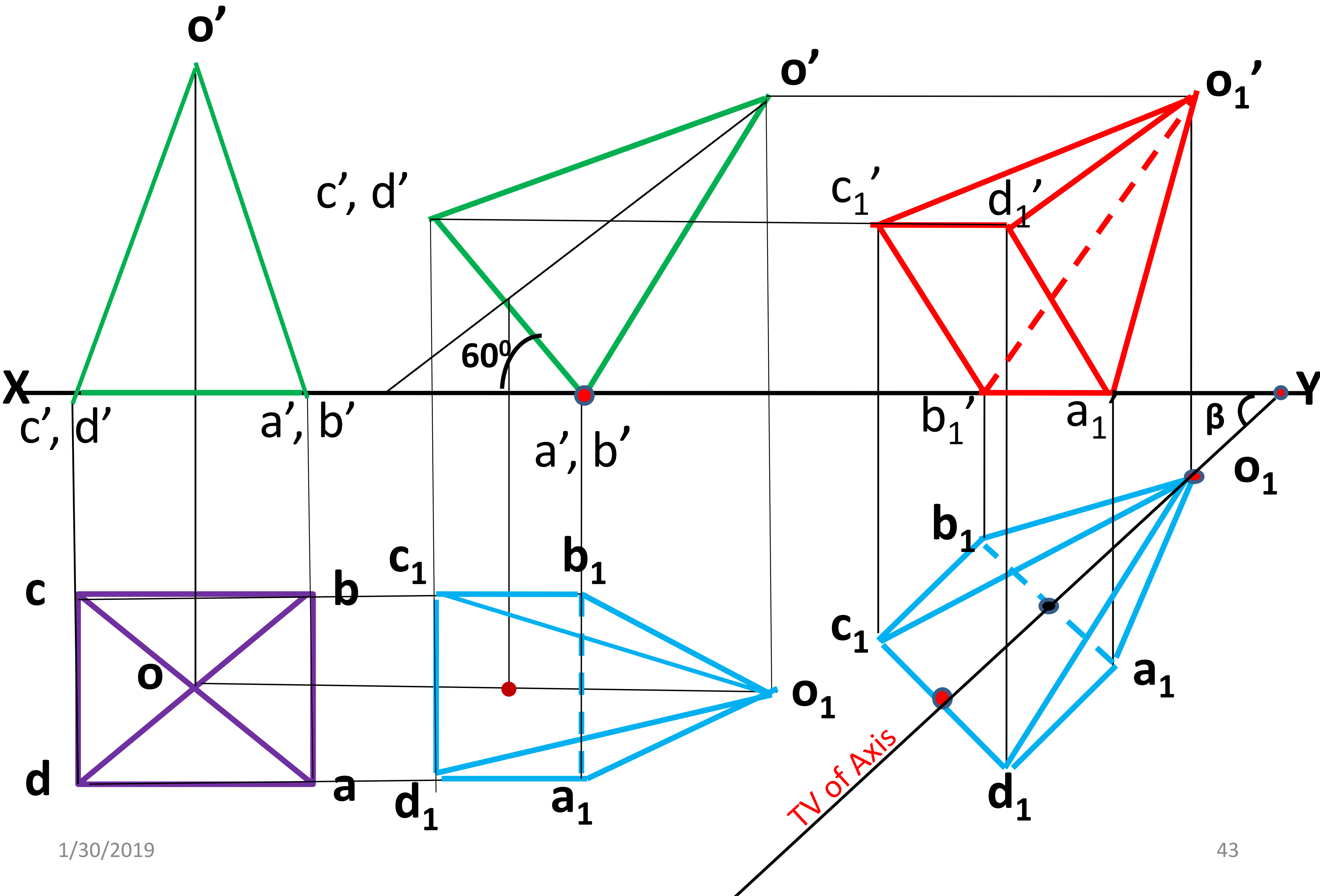
Fig(6). – FV – Show all lines in the solid. (visible/invisible)

β value from:

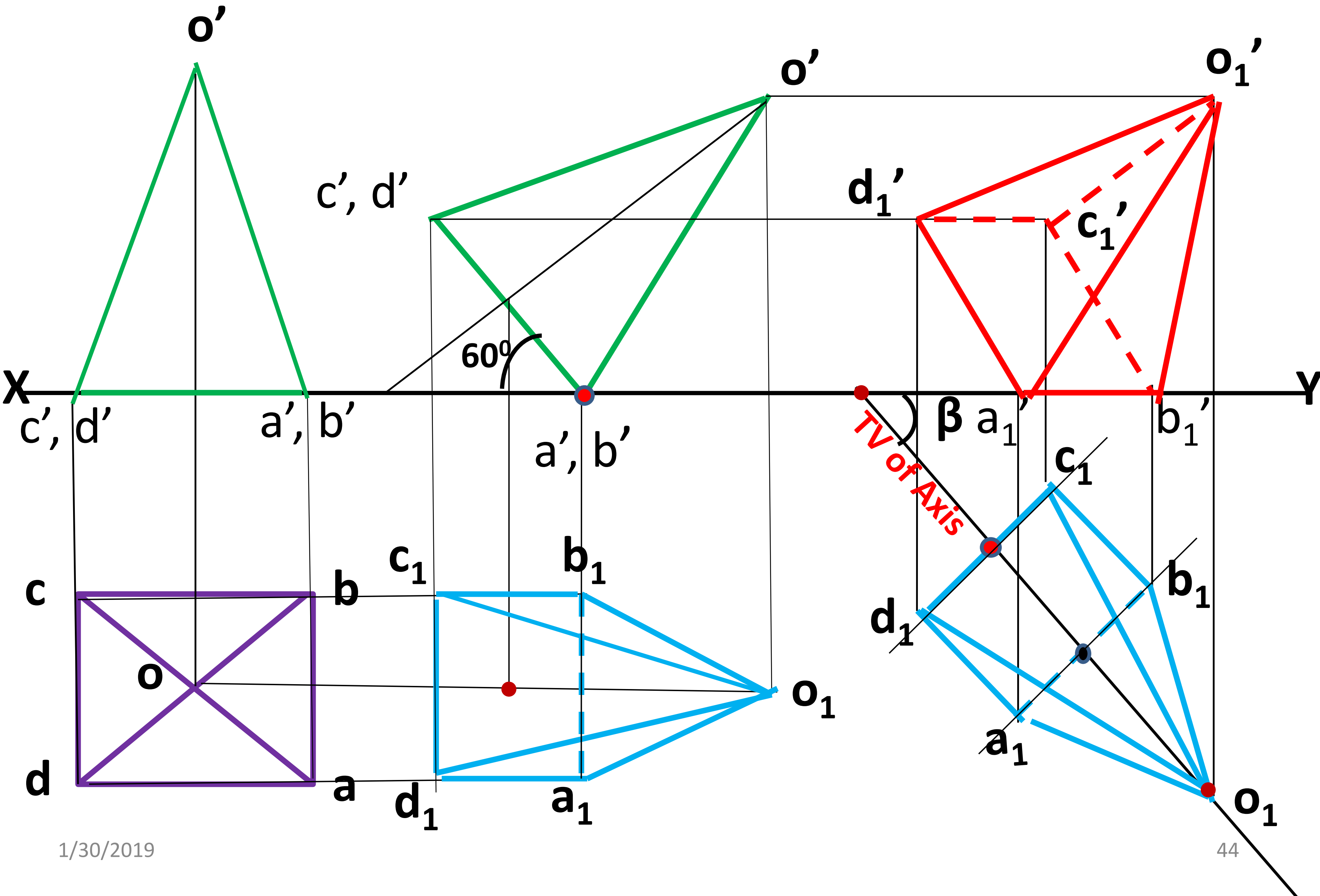
1. ϕ value.
2. TL of axis.
3. PL of axis



Q(4) Vertex nearer to VP



Q(4) Vertex nearer to observer



Question - 5

A square pyramid 40 mm side of base and axis 70 mm long is resting on HP on one of its base corners. Axis is inclined 30^0 to HP. The vertical plane containing the axis makes 45^0 to VP. Draw projections of the pyramid. Vertex of the pyramid is away from VP.

Square pyramid	One Base Corner on HP	Axis inclined to HP. (θ given)	Vertical plane containing the axis inclined to VP. (β given)	Vertex away from VP

Q5.

Fig(1). – TV – Base in true shape – *corner position.*

TV of slant edges

Fig(2). – FV – a', b', c' & d' on XY

Fig(3). – FV – position w r t HP.

a' on XY & θ (axis) = 30^0 to XY

Fig(2) & Fig(3) are of same shape

Fig(4). – TV – Show all lines in the solid. (visible/invisible)

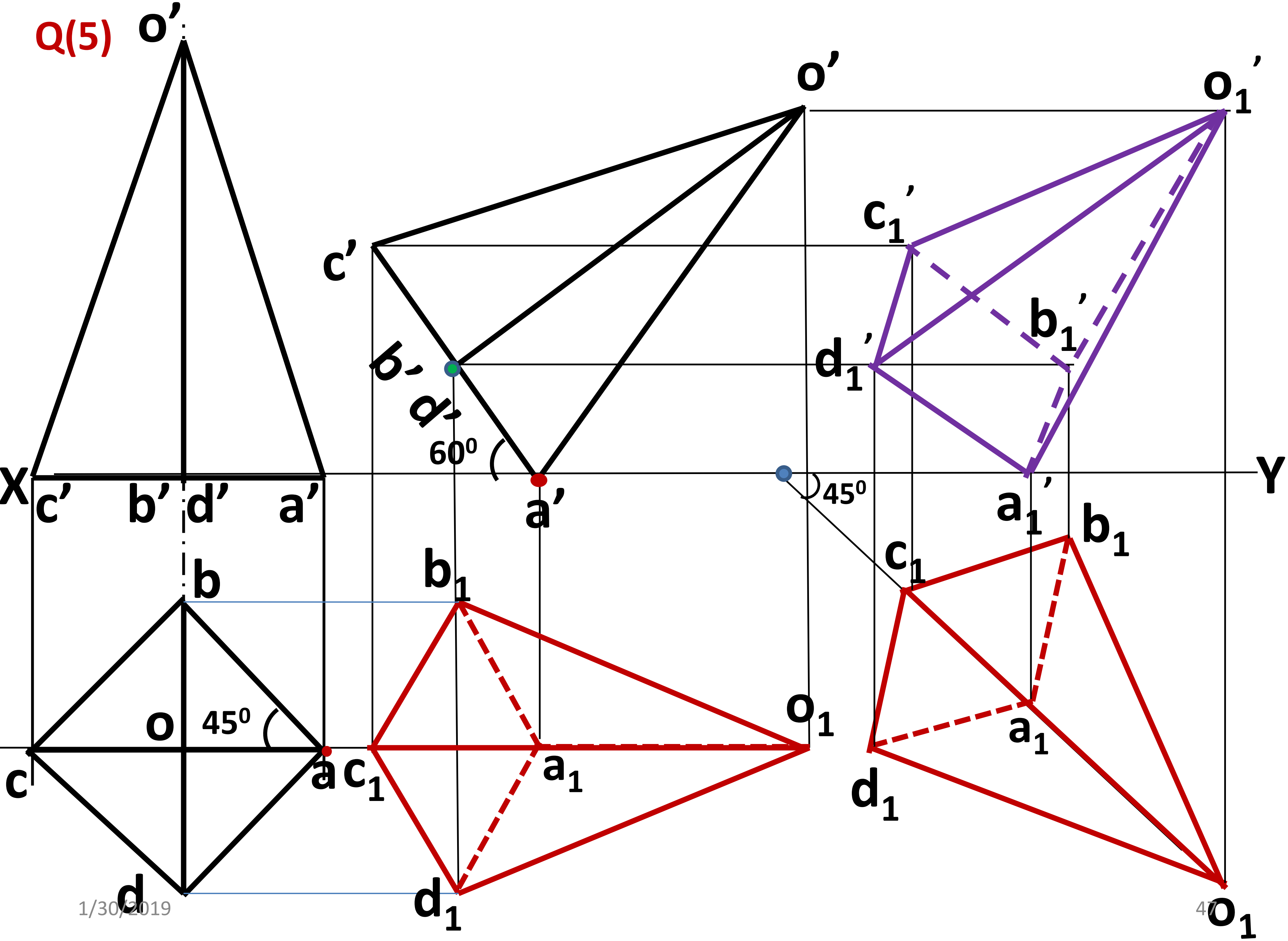
Fig(5). – TV – position w r t VP.

given, φ (vertical plane) = 45^0 = β (axis),

Also keep o_1 away from XY. **- copy paste Fig(4).**

Fig(6). – FV – Show all lines in the solid. (visible/invisible)

Q(5)


o'
X
Y
c'
b'
d'
a'
b
o
45^0
a
c
d
c'
b'd'
60^0
a'
o'
b_1
c_1
a_1
o_1
d_1
45^0
c_1'
b_1'
d_1'
a_1'
o_1'
b_1
c_1
a_1
d_1
o_1

Question - 6

Δ^{lar} *face position* = *Base edge position*

A square pyramid 40 mm side of base and axis 70 mm long is lying on HP on one of its triangular faces. In the top view axis of the pyramid appears inclined 45^0 to VP. Draw projections of the pyramid. Vertex of the pyramid is away from VP.

Square pyramid	A triangular face on HP	TV of Axis inclined to XY. (β given)	Vertex away from VP

Q6.

Fig(1). – TV – Base in true shape.

Triangular face position = base edge position.

TV of slant edges

Fig(2). – FV – a', b', c' & d' on XY

Fig(3). – FV – position w r t HP. - o'*a'b' on XY.*

Fig(2) & Fig(3) are of same shape

Fig(4). – TV – Show all lines in the solid. (visible/invisible)

Fig(5). – TV – position w r t VP.

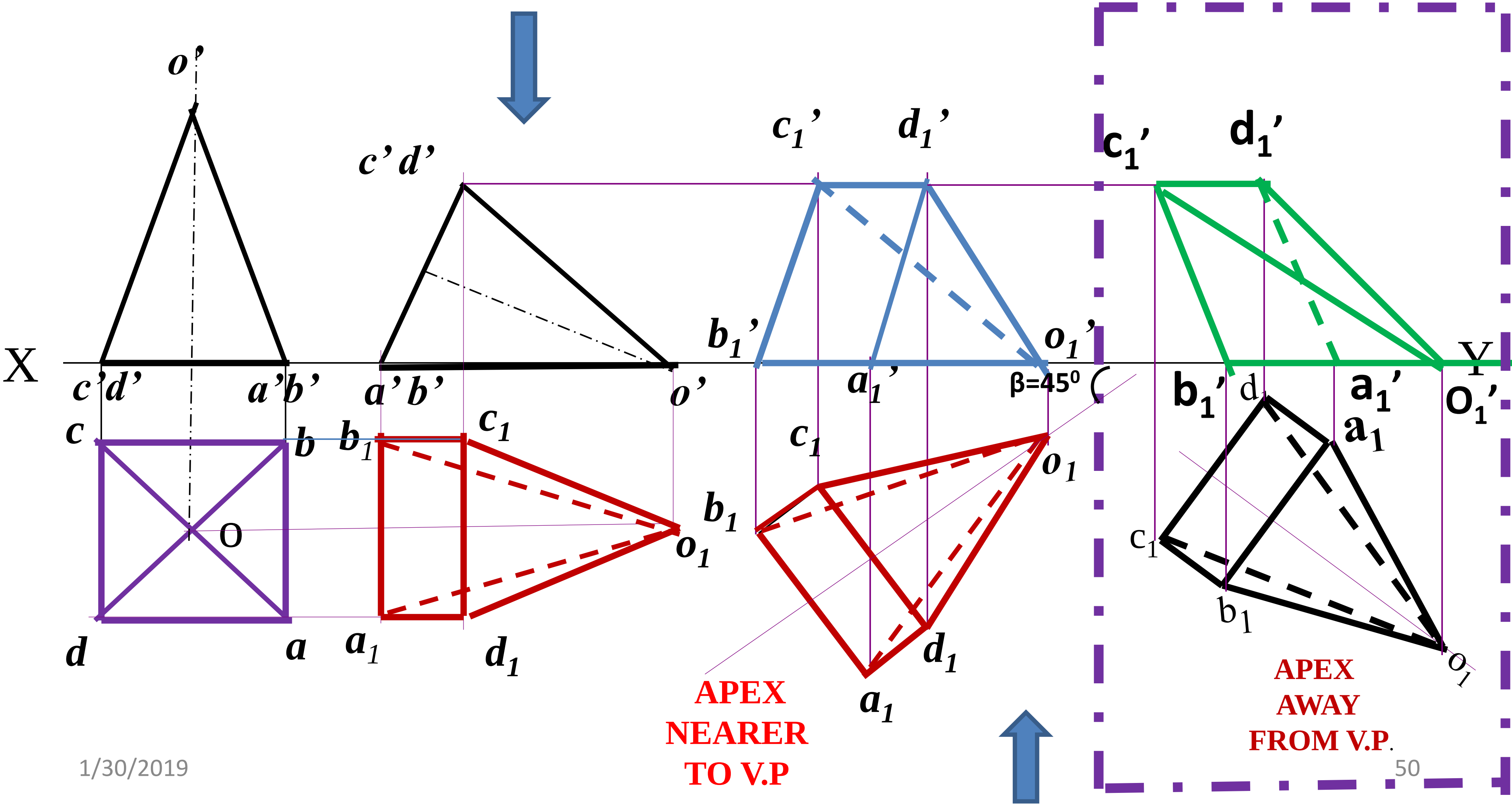
given, φ (vertical plane) = 45^0 = β (axis),

Also keep o_1 away from XY. **- copy paste Fig(4).**

Fig(6). – FV – Show all lines in the solid. (visible/invisible)

Q(6)

Triangular face position (equivalent to base edge position)



Question -7

A pentagonal pyramid 30 mm side of base and axis 70 mm long is resting on VP on one of its base edges. Axis is inclined 30^0 to VP. The front view of the axis makes 45^0 to XY line. Draw projections of the pyramid. Vertex of the pyramid is on HP.

Pentagonal pyramid	One Base edge onVP	Axis inclined to VP. (ϕ given)	FV of Axis inclined to XY. (α given)	Vertex on HP

Q(7).

Fig(1). – FV – Base in true shape – (a' b') ⊥ to XY

TV of slant edges

Fig(2). – TV – a, b, c & d on XY

Fig(3). – TV – position w r t VP.

(a, b) (single point) on XY & φ (axis) = 30^0 to XY

Fig(2) & Fig(3) are of same shape.

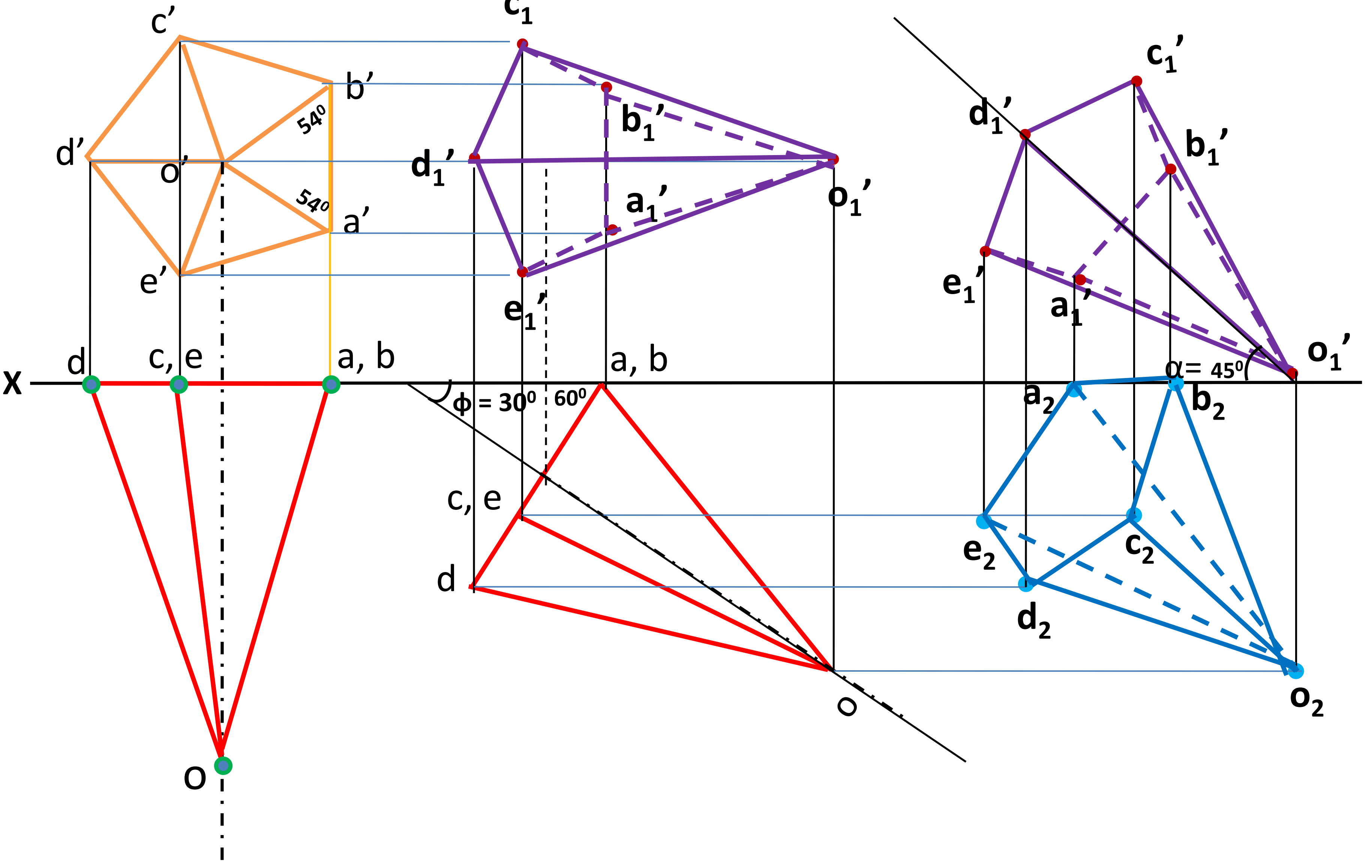
Fig(4). – TV – Show all lines in the solid. (visible/invisible)

Fig(5). – TV – position w r t VP – α *(axis) = 45^0 & o_1' on XY*

- copy paste Fig(4).

Fig(6). – FV – Show all lines in the solid. (visible/invisible)

Q(7).



c'
b'
54^0
d'
o'
54^0
a'
e'
X
d
c, e
a, b
o
c_1'
b_1'
d_1'
a_1'
o_1'
e_1'
a, b
$\phi = 30^0$
60^0
c, e
d
o
c_1'
d_1'
b_1'
e_1'
a_1'
o_1'
$\alpha = 45^0$
Y
a_2
b_2
e_2
c_2
d_2
o_2

QUESTION - 8

A hexagonal pyramid base 30 mm side and axis 70 mm long has one of its slant edge on ground. A plane containing that edge and axis is perpendicular to H P and inclined at 45^0 to V P. Draw its projections when the apex is nearer to V P than the base.

Hexagonal pyramid	**One Slant edge on ground**	**A plane containing that edge and axis is perpendicular to HP and inclined to V P.**	**Vertex nearer to VP**

Q8.

Fig(1). – TV – Base in true shape.

Slant edge position = corner position

TV of slant edges

Fig(2). – FV – a', b', c' & d' on XY

Fig(3). – FV – position w r t HP. - o'*a' on XY.*

Fig(2) & Fig(3) are of same shape

Fig(4). – TV – Show all lines in the solid. (visible/invisible)

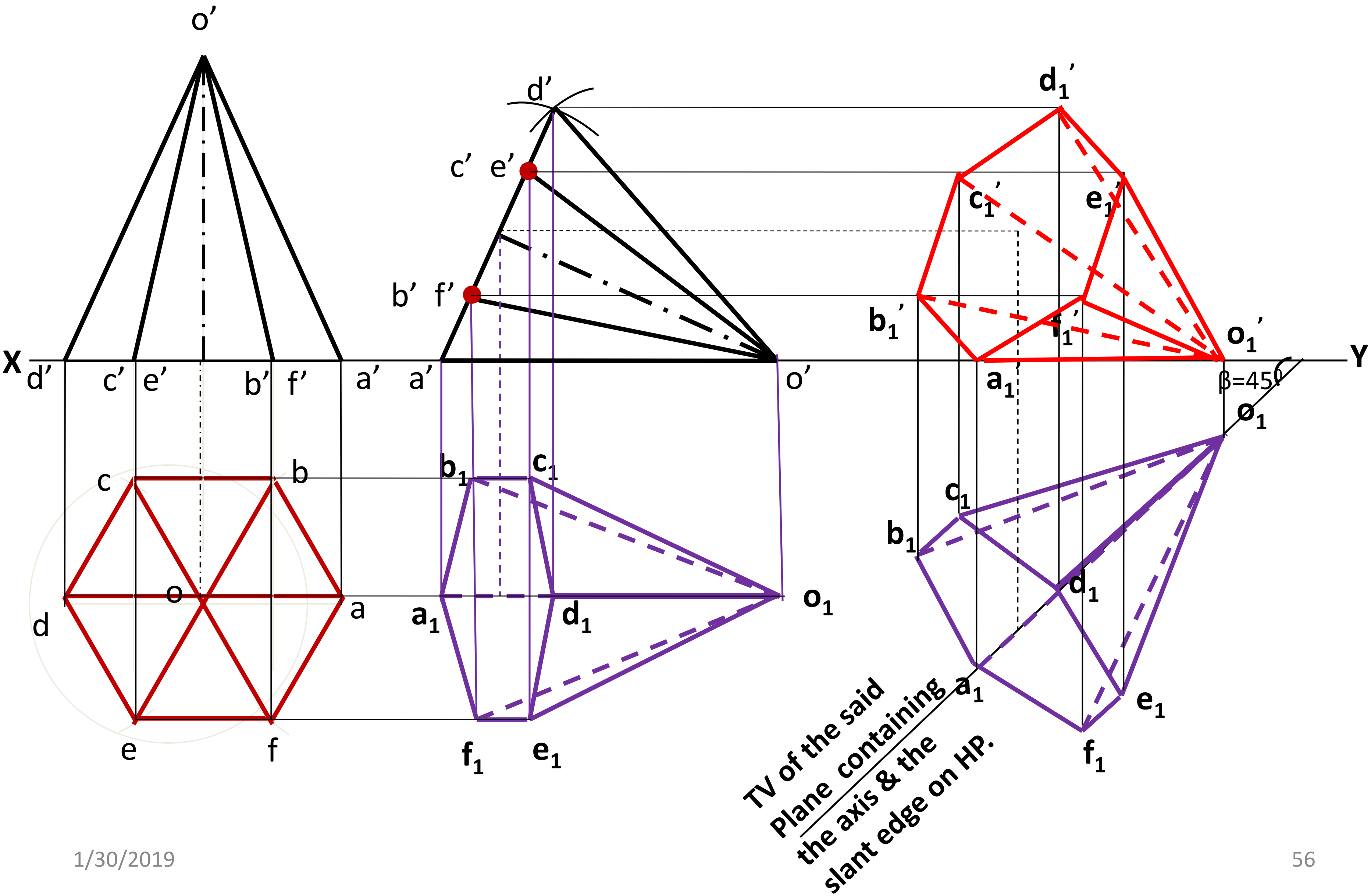
Fig(5). – TV – position w r t VP.

φ (vertical plane) = 45^0 = β (axis) = β (slant edge)

Also keep o_1 nearer to XY. **- copy paste Fig(4).**

Fig(6). – FV – Show all lines in the solid. (visible/invisible)

Q(8).



o’
d’
c’ e’
b’ f’
X
Y
d’
c’
e’
b’
f’
a’
a’
o’
c
b
o
d
a
e
f
b_1
c_1
a_1
d_1
o_1
f_1
e_1
d_1’
c_1’
e_1’
b_1’
f_1’
o_1’
a_1’
β=45º
o_1
c_1
b_1
d_1
a_1
e_1
f_1
TV of the said
Plane containing
the axis & the
slant edge on HP.

Question -9

A triangular pyramid 50 mm side of base and axis 80 mm long is resting on VP on one of its base corners. Axis is inclined 45^0 to HP and 30^0 to VP. Vertex of the pyramid is nearer to observer. Lowest point of the pyramid is 15 mm above HP. Draw projections of the pyramid.

A pentagonal pyramid	**Freely suspended from a corner of base**	**Plane containing the axis parallel to VP.**

Q9.

Fig(1). – FV – Base in true shape.

Corner position

FV of slant edges

Fig(2). – TV – a, b, c & d on XY

Fig(3). – TV – position w r t VP. - *– a, on XY & φ (axis) = 30^0 to XY*

Fig(2) & Fig(3) are of same shape

Fig(4). – FV – Show all lines in the solid. (visible/invisible)

Fig(5). – FV – position w r t HP. θ (axis) = 45^0

–α (axis) to be obtained & o_1' away from XY.

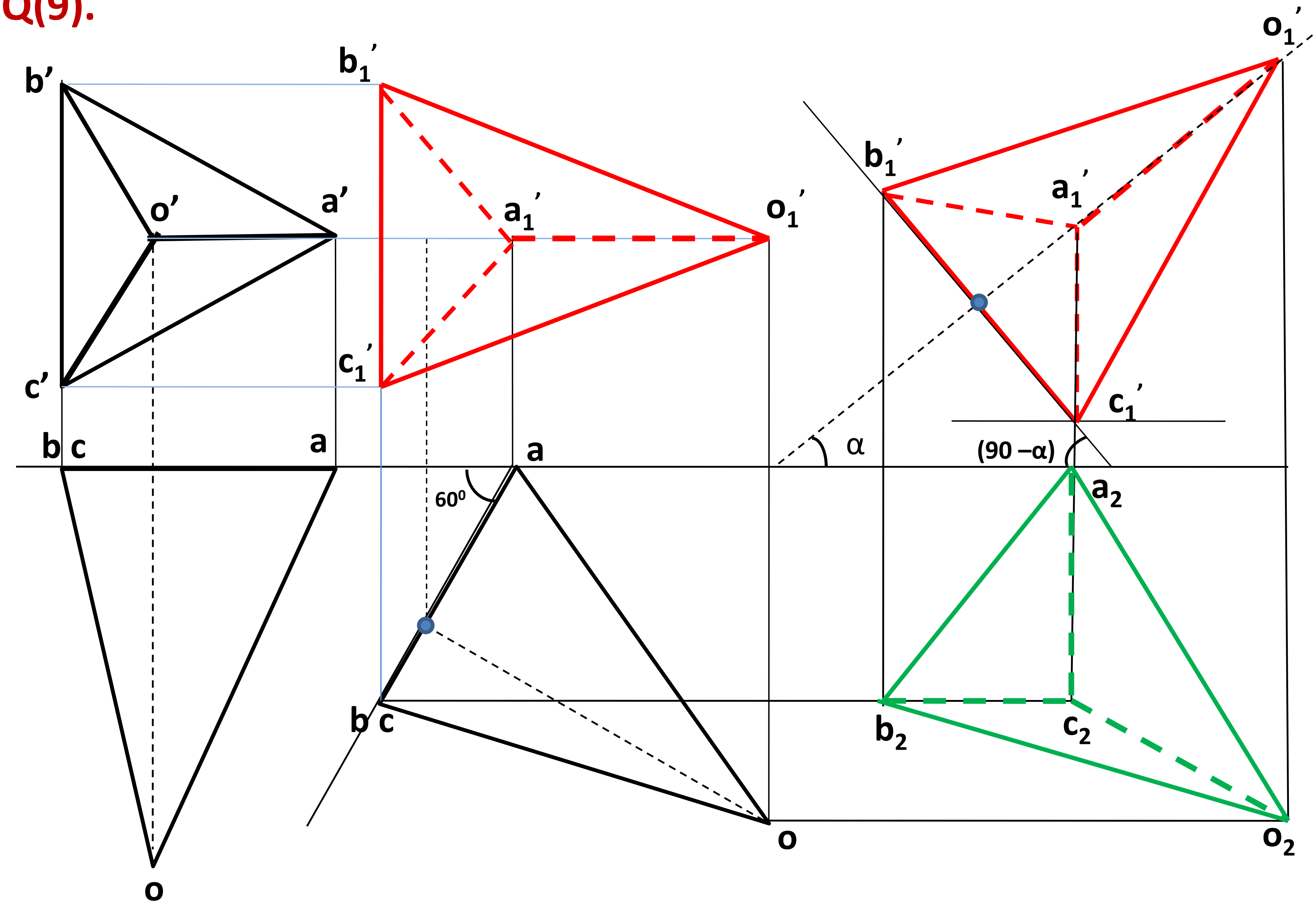
Also keep o_1 nearer to XY. &

keep the lowest point of fig(5) 15 mm below XY.

- copy paste Fig(4).

Fig(6). – TV – Show all lines in the solid. (visible/invisible)

Q(9).



Question – 10.

A pentagonal pyramid 30 mm base sides & 60 mm long axis, is freely suspended from one corner of base so that a plane containing it's axis remains parallel to VP. Draw it's three views.

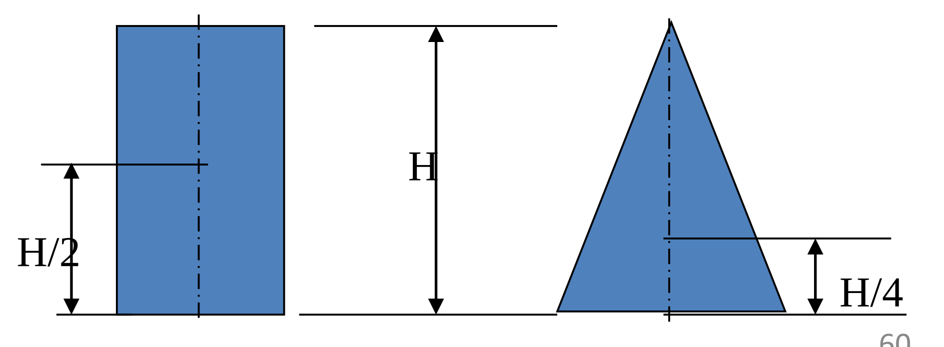
A pentagonal pyramid	**Freely suspended from a corner of base**	**Plane containing the axis parallel to VP.**

IMPORTANT:

When a solid is freely suspended from a corner, then line joining point of contact & C.G. remains vertical. (Here axis has inclination with HP.)

FREELY SUSPENDED SOLIDS:

Positions of CG, on axis, from base.



(Cylinder & Prisms) **(Cone & Pyramids)**

Q10.

Fig(1). – TV – string perpendicular to HP. Base in true shape.

Corner position - **TV of slant edges**

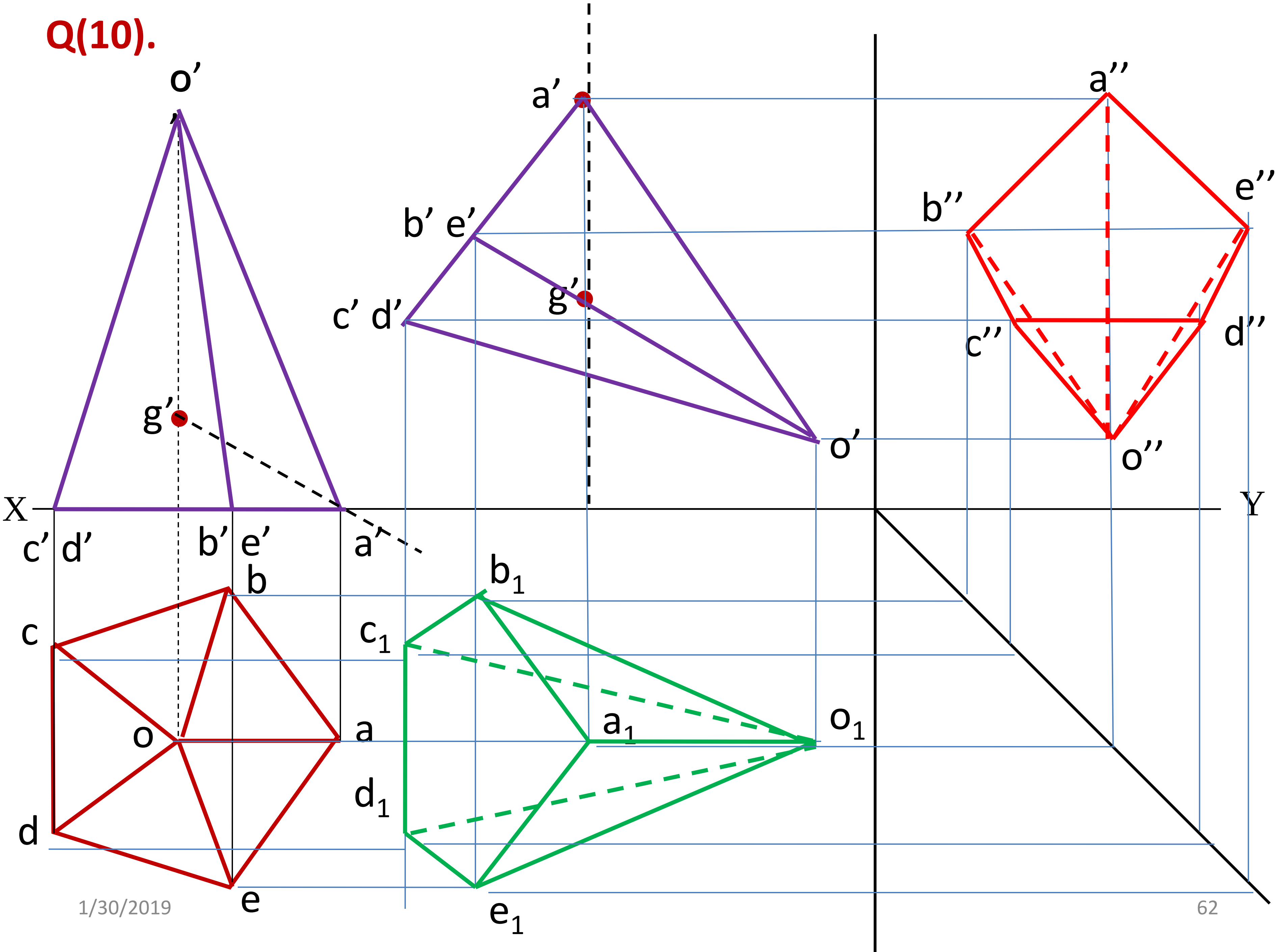
Fig(2). – FV – a’, b’, c’, d’ & on XY

Fig(3). – FV – position w r t HP. – θ (string) = 90^0

Fig(2) & Fig(3) are of same shape

Fig(4). – TV – Show all lines in the solid. (visible/invisible)

Q(10).



Question – 11.

A square pyramid of base side 40 mm and axis 60 mm long is resting on VP on a base edge. Draw projections of the pyramid if axis inclined at 30° to HP and 40° to VP.

Square pyramid	One Base edge on VP	Axis inclined to VP (ϕ given)	Axis inclined to HP (θ given)

Q11.

Fig(1). – FV – Base in true shape.

Base edge position

FV of slant edges

Fig(2). – TV – a, b, c & d on XY

Fig(3). – TV – position w r t VP. –

– (a,b) on XY & φ (axis) = 40^0 to XY

Fig(2) & Fig(3) are of same shape

Fig(4). – FV – Show all lines in the solid. (visible/invisible)

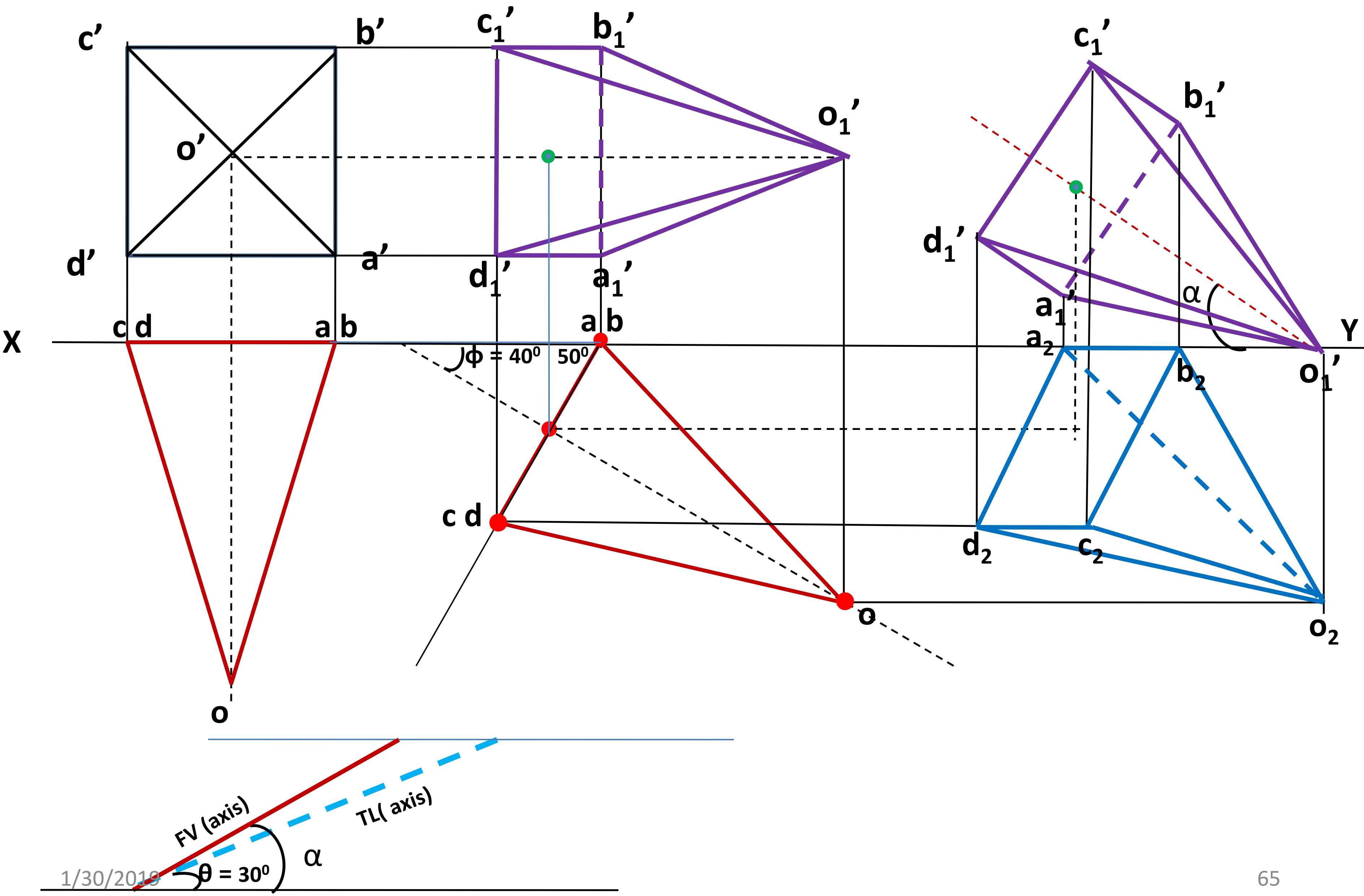
Fig(5). – FV – position w r t HP. θ (axis) = 30^0

–α (axis) to be obtained & o_1' away from XY./ near to XY

- copy paste Fig(4).

Fig(6). – TV – Show all lines in the solid. (visible/invisible)

Q(11).



c'
b'
c_1'
b_1'
o'
o_1'
d'
a'
d_1'
a_1'
X
c d
a b
a b
$\phi = 40^0$
50^0
c d
o
o
c_1'
b_1'
d_1'
α
a_1'
a_2
Y
b_2
o_1'
d_2
c_2
o_2
FV (axis)
TL(axis)
α
$\theta = 30^0$

Question – 12.

A square pyramid of base edge 50 mm and height 70 mm is resting on a base edge on HP with the axis inclined at 45° to HP. Draw the projections of the square pyramid if the base edge on HP is inclined at 60° to VP. Assume that the apex of the pyramid is nearer to the vertical plane.

Square pyramid	**A triangular face vertical**	**Base edge of the triangular face parallel to VP.**	**Base visible in front view.**

Q12.

Fig(1). – TV – Base in true shape – (a b) ⊥ to XY

TV of slant edges

Fig(2). – FV – a', b', c' & d' on XY

Fig(3). – FV – position w r t HP.

a', b' on XY & θ (axis) = 45^0 to XY

Fig(2) & Fig(3) are of same shape

Fig(4). – TV – Show all lines in the solid. (visible/invisible)

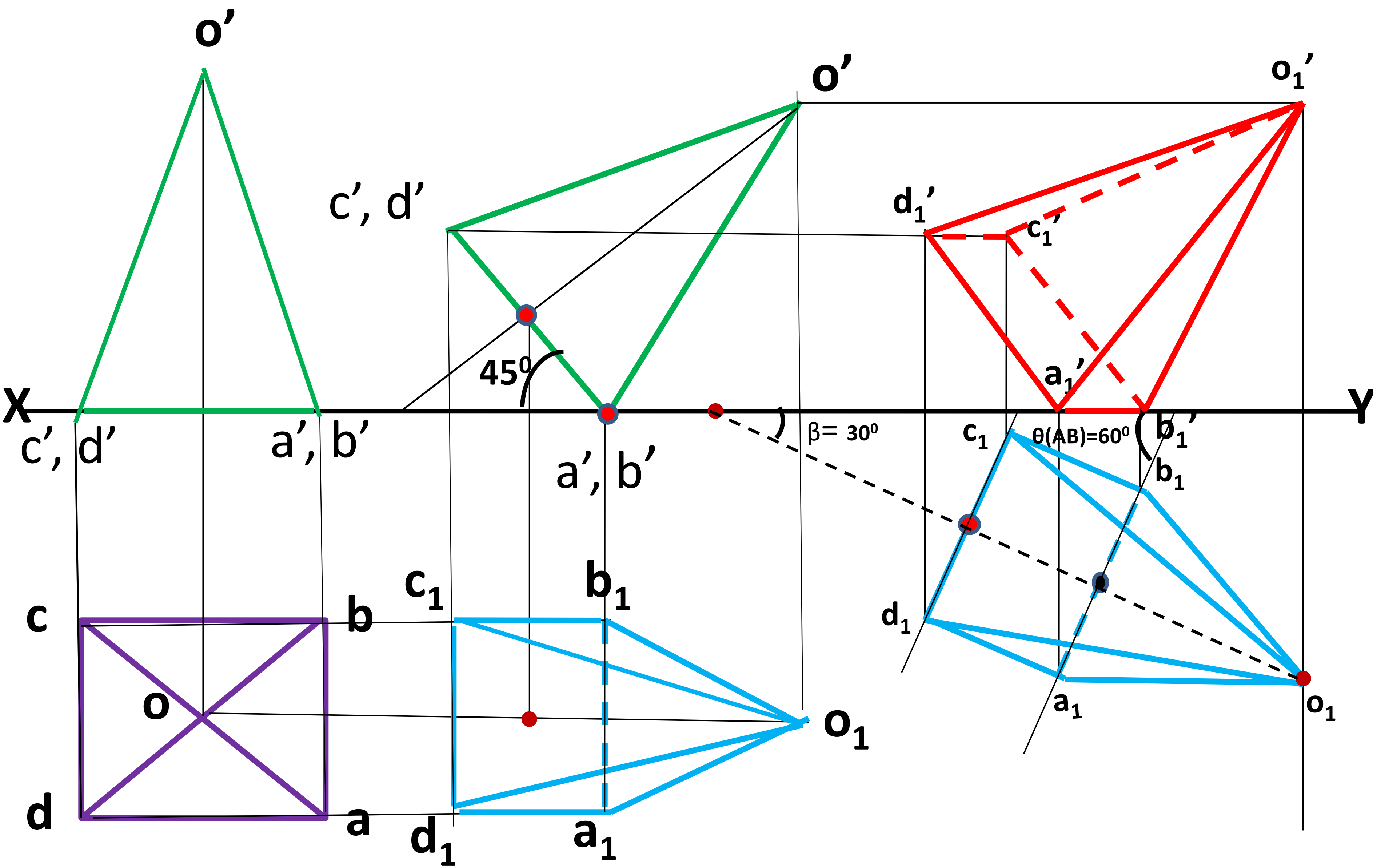
Fig(5). – TV – position w r t VP –*given, φ (AB) = 60^0 = β (AB)*

since, in fig(4) $a_1 b_1$ is in True Length.

***Also keep o_1 nearer to XY.* - copy paste Fig(4).**

Fig(6). – FV – Show all lines in the solid. (visible/invisible)

Q(12).



o’
o’
o_1’
c’, d’
d_1’
c_1’
45^0
a_1’
X
Y
c’, d’
a’, b’
a’, b’
β= 30^0
c_1
θ(AB)=60^0
b_1’
b_1
c_1
b_1
c
b
d_1
o
o_1
a_1
o_1
d
a
d_1
a_1

Question – 13

A square pyramid is kept with a triangular face vertical. The base edge of that triangular face parallel to VP. Draw the projections of the pyramid so that the base is visible in the front view.

Square pyramid	OAB vertical	AB parallel to VP.	Base visible in FV.

Q13.

Fig(1). – TV – CV - Base on HP– Base edge position - (a b) ⊥ to XY

TV of slant edges

Fig(2). – FV – a’, b’, c’ & d’ on XY

Fig(3). – FV – position w r t HP - *o’ a’ b’* ⊥ to XY.

Fig(2) & Fig(3) are of same shape

Fig(4). – TV – Show all lines in the solid. (visible/invisible)

Fig(5). – TV – position w r t VP –*given, AB parallel to VP.*

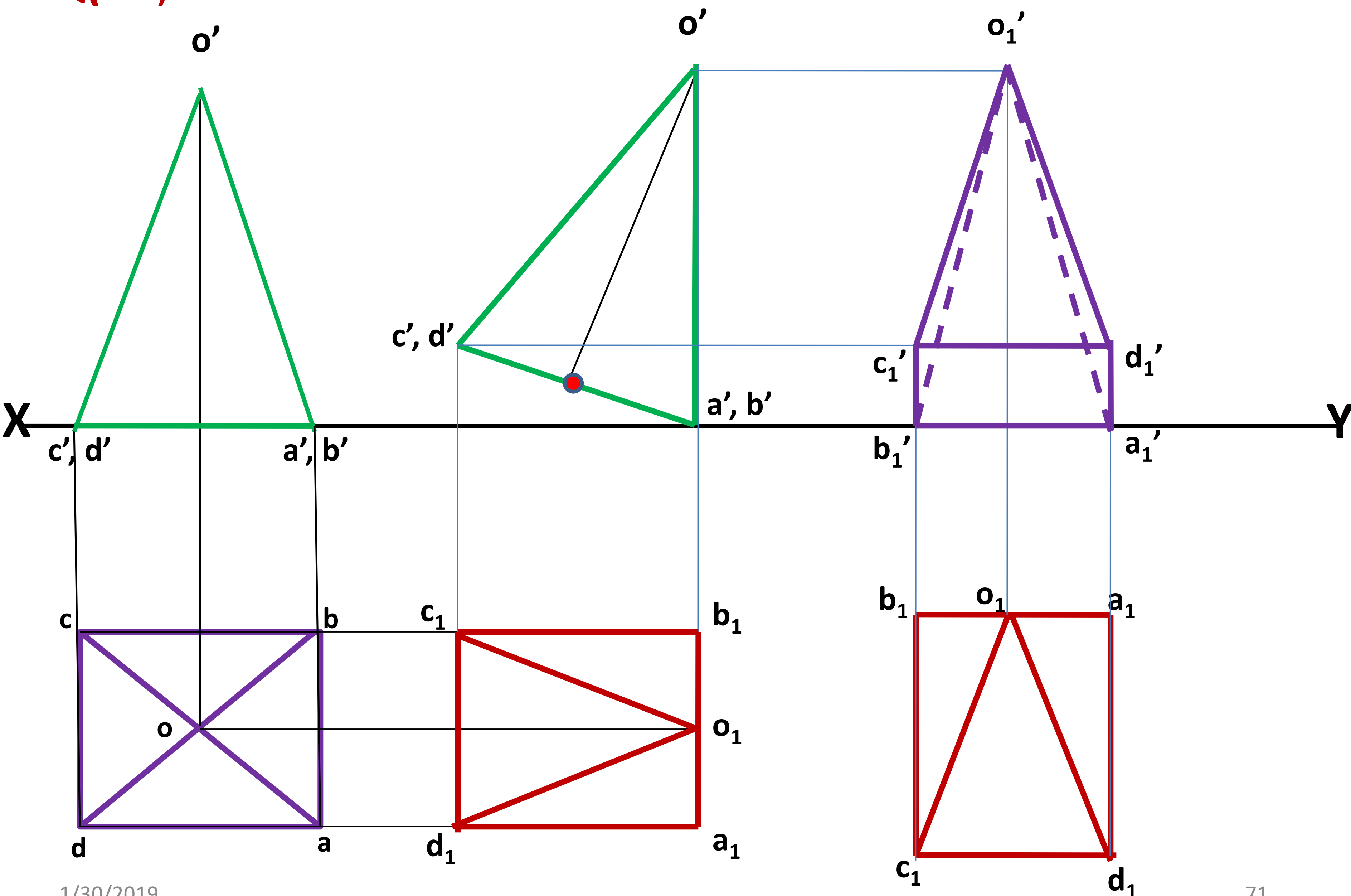
Hence, a_1 b_1 parallel to XY. – a_1 b_1 is in True Length.

– vertex nearer to VP. (so that base visible in FV).

- copy paste Fig(4).

Fig(6). – FV – Show all lines in the solid. (visible/invisible)

Q(13).



Question – 14

Cone, 50 mm. base diameter and axis 80 mm. long rests at a point on the circumference of its base on HP. Axis inclined 30^0 to HP and 45^0 to VP. Draw the projections of the cone, when the apex is on VP.

Cone	**A point on the circumference of the base on HP**	**Axis inclined to HP.(θ given)**	**Axis inclined to VP.(ϕ given)**	**Apex on VP.**

Q14.

Fig(1). – TV – Base in true shape – Circle of given diameter.

– 8 generators, equally spaced – very thin

– numbered 1 to 8

Fig(2). – FV – 1', 2', 3', 4',5',6', 7' & 8' on XY

Fig(3). – FV – position w r t HP – 1'on XY & base at (90 – θ) to XY.

Fig(2) & Fig(3) are of same shape

Fig(4). – TV – Visible & invisible portions.

Fig(5). – TV – position w r t VP –*given, φ(axis).*

***Since, PL (axis) < TL(axis), Obtain* β(axis).**

- copy paste Fig(4).

Fig(6). – FV – Visible & invisible portions.

Q(15).

Fig(2). – FV – 1’, 2’, 3’, 4’,5’,6’, 7’ & 8’ on XY - base at (90 – θ) to XY.

Fig(3). – FV – position w r t HP – 1’on XY –

Fig(2) & Fig(3) are of same shape

Fig(6). – FV – Visible & invisible portions

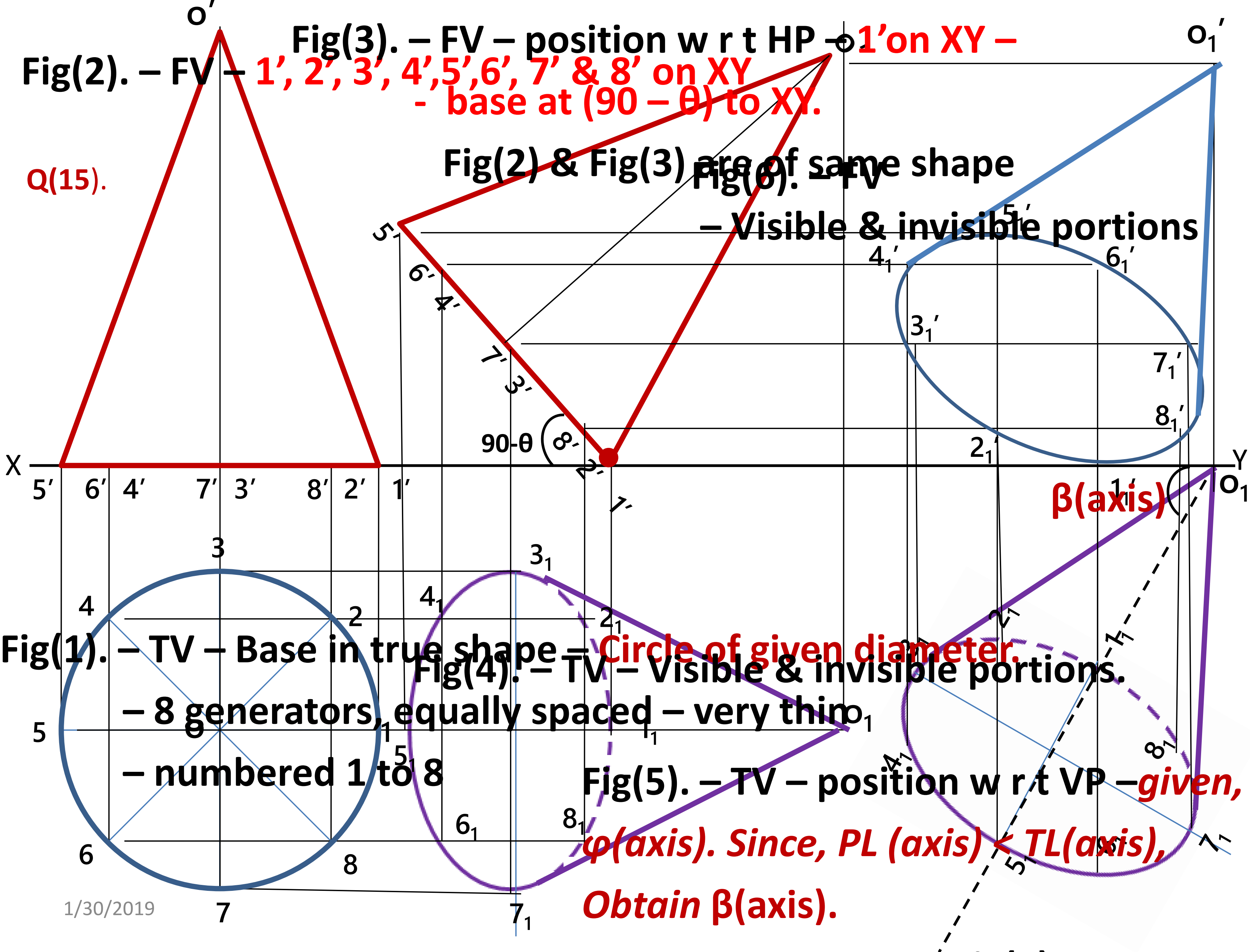
Fig(1). – TV – Base in true shape – Circle of given diameter.

– 8 generators, equally spaced – very thin

– numbered 1 to 8

Fig(4). – TV – Visible & invisible portions.

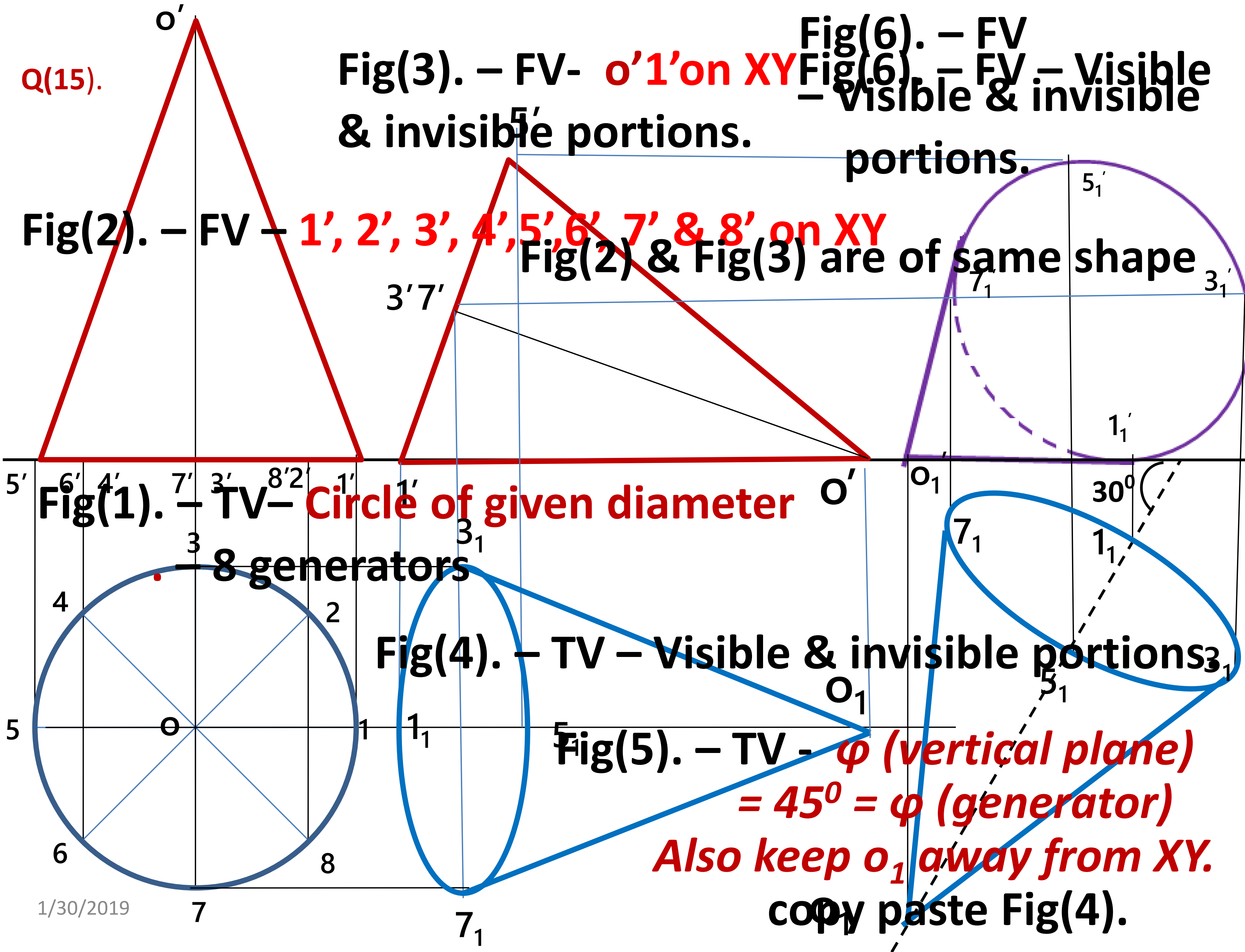
Fig(5). – TV – position w r t VP – *given, φ(axis). Since, PL (axis) < TL(axis), Obtain β(axis).*



Question – 15

Cone, 50 mm. base diameter and axis 80 mm. long lies on HP on a generator. A plane containing the generator and axis is perpendicular to HP and inclined 45^0 to VP. Draw the projections of the cone, when the apex is nearer to the observer.

Cone	**A generator on HP**	**ϕ (plane)=β(axis)= 30^0**	**Apex nearer to observer.**



Q(15).
Fig(3). – FV- o'1'on XY & invisible portions.
Fig(6). – FV
Fig(6). – FV – Visible – Visible & invisible portions.
Fig(2). – FV – 1', 2', 3', 4',5',6', 7' & 8' on XY
Fig(2) & Fig(3) are of same shape
Fig(1). – TV– Circle of given diameter
. – 8 generators
Fig(4). – TV – Visible & invisible portions
Fig(5). – TV - φ (vertical plane) = 45⁰ = φ (generator)
Also keep o1 away from XY.
copy paste Fig(4).
o'
5'
3'7'
5' 6' 4' 7' 3' 8'2' 1'
1'
O'
5₁'
7₁
3₁'
1₁'
o₁
30⁰
3
4
2
5
o
1
6
8
7
3₁
1₁
5₁
7₁
O₁
5₁
3₁
1₁
7₁
o₁

Question – 16

Cylinder 60 mm. diameter and axis 80 mm. long is lying on HP on a generator. Axis of the cylinder is inclined 40^0 to VP. Draw projections of the cylinder.

Generator on HP, hence, axis parallel to HP. Given ,axis inclined to VP - Two stage solution.

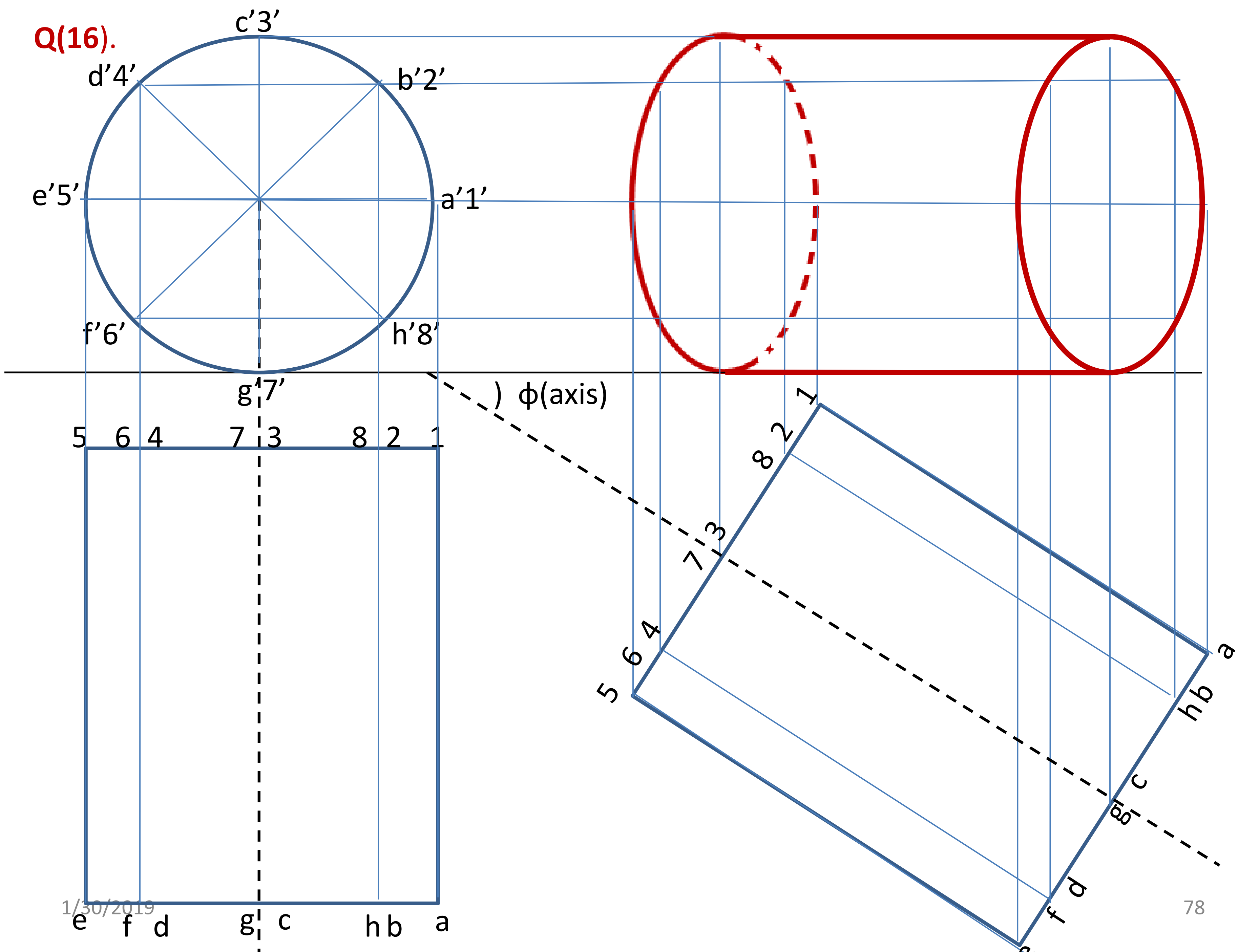
Axis inclined to VP.(Base inclined to VP).

Fig(1): FV – Base on VP / parallel to VP - Circle touching XY.
Fig(2): TV .

Fig(3): TV .*ϕ(axis) = 40^0 to XY -* copy paste Fig(2).

Fig(4): FV - – Visible & invisible portions.

Q(16).


c'3'
d'4'
b'2'
e'5'
a'1'
f'6'
h'8'
g'7'
ϕ(axis)
5 6 4 7 3 8 2 1
e f d g c h b a
1 2 8 3 7 4 6 5
a hb c g d f

Question – 17

Hexagonal prism 30 mm. side of base and axis 80 mm. long is kept with a rectangular face on VP. Axis of the prism is inclined 40^0 to HP. Draw projections of the prism.

Rectangular face on VP. → axis || to VP.

Axis inclined to HP. → Two stage solution.

Axis inclined to HP in stage 2. i.e. in fig(3), the FV.

Fig(3) → FV, fig(2) → FV & hence, fig(1) → TV.

Rectangular face on VP. → in fig(1).

i.e. TV of the Rectangular face on VP is on XY.

Question – 17

Hexagonal prism 30 mm. base side and axis 80 mm. long is resting on VP on a rectangular face.

Axis of the prism is inclined 40^0 to HP.

Draw projections of the prism.

Rectangular face on VP. → axis || to VP.

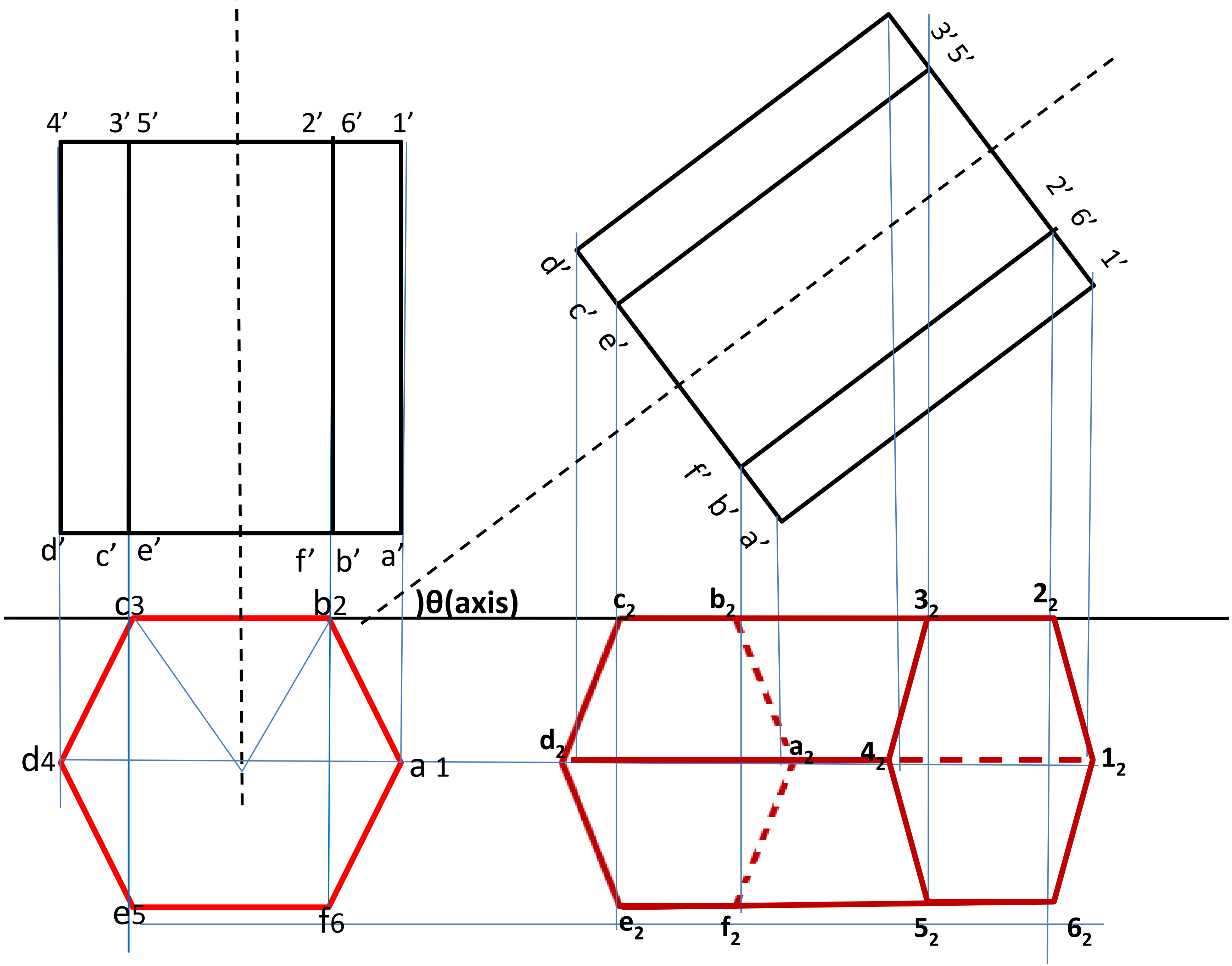
Axis inclined to HP. → Two stage solution.

Axis inclined to HP in stage 2. i.e. in fig(3), the FV.

Fig(3) → FV, fig(2) → FV & hence, fig(1) → TV.

Rectangular face on VP. → in fig(1).

i.e. TV of the Rectangular face on VP is on XY.



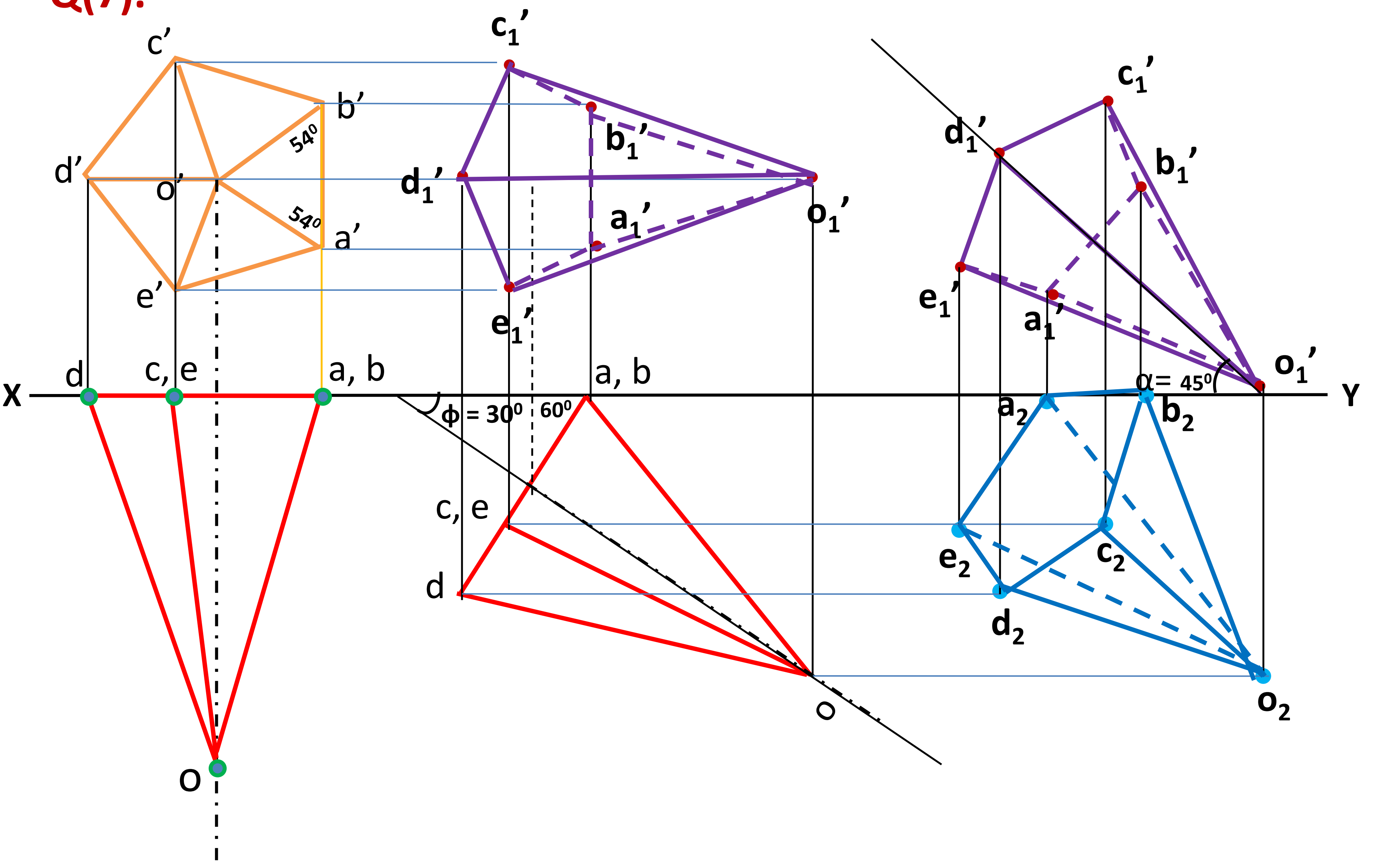
4’ 3’ 5’ 2’ 6’ 1’
d’ c’ e’ f’ b’ a’
c3 b2
)θ(axis)
d4
a 1
e5 f6
3’5’
2’ 6’
1’
d’
c’ e’
f’ b’
a’
c_2 b_2 3_2 2_2
d_2 a_2 4_2 1_2
e_2 f_2 5_2 6_2

Pyramid

1. A triangular face on VP

2.
- a). FV of Axis inclined to XY
- b). Axis inclined to HP
- c). Plane ⊥ to VP & containing the axis inclined to HP
- d). FV, of axis appears inclined to HP
- e). Base edge of the triangular face on VP inclined to HP

Q(7).



c'
b'
54⁰
d'
o'
54⁰
a'
e'
X
d
c, e
a, b
o
c₁'
b₁'
d₁'
a₁'
o₁'
e₁'
a, b
ϕ = 30⁰
60⁰
c, e
d
o
c₁'
d₁'
b₁'
e₁'
a₁'
o₁'
α= 45⁰
Y
a₂
b₂
e₂
c₂
d₂
o₂

Projections of Solids – Q17

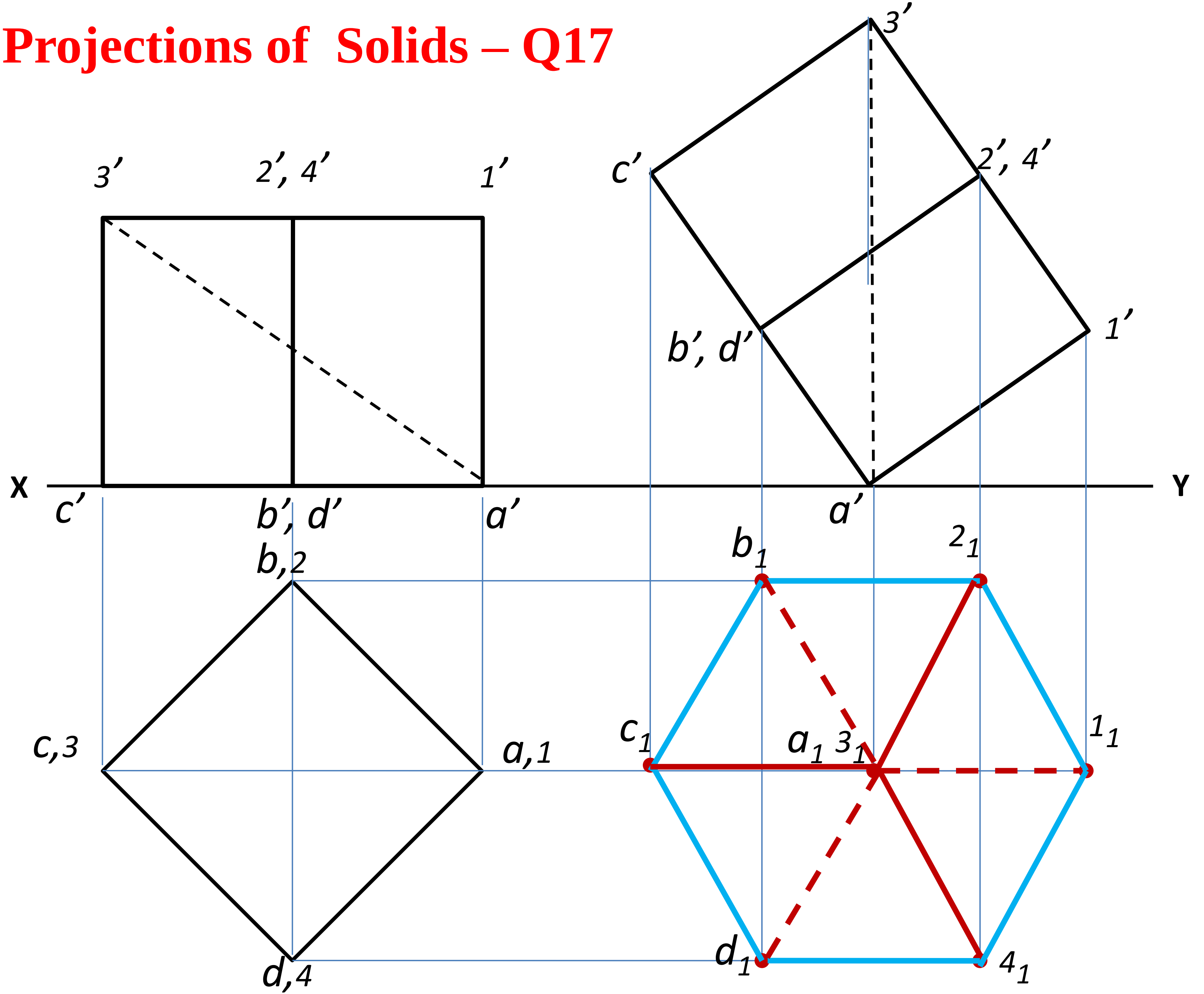
A cube of 50 mm edge resting on one of its corners on HP. Draw the projections of the cube when the body diagonal of the cube is perpendicular to HP.

Fig(1): ***TV in CORNER Position***

Fig(3): ***(1) a' on XY.***

(2) a'- 3 ' (The FV of the Body diagonal) Perpendicular to XY.

Projections of Solids – Q17



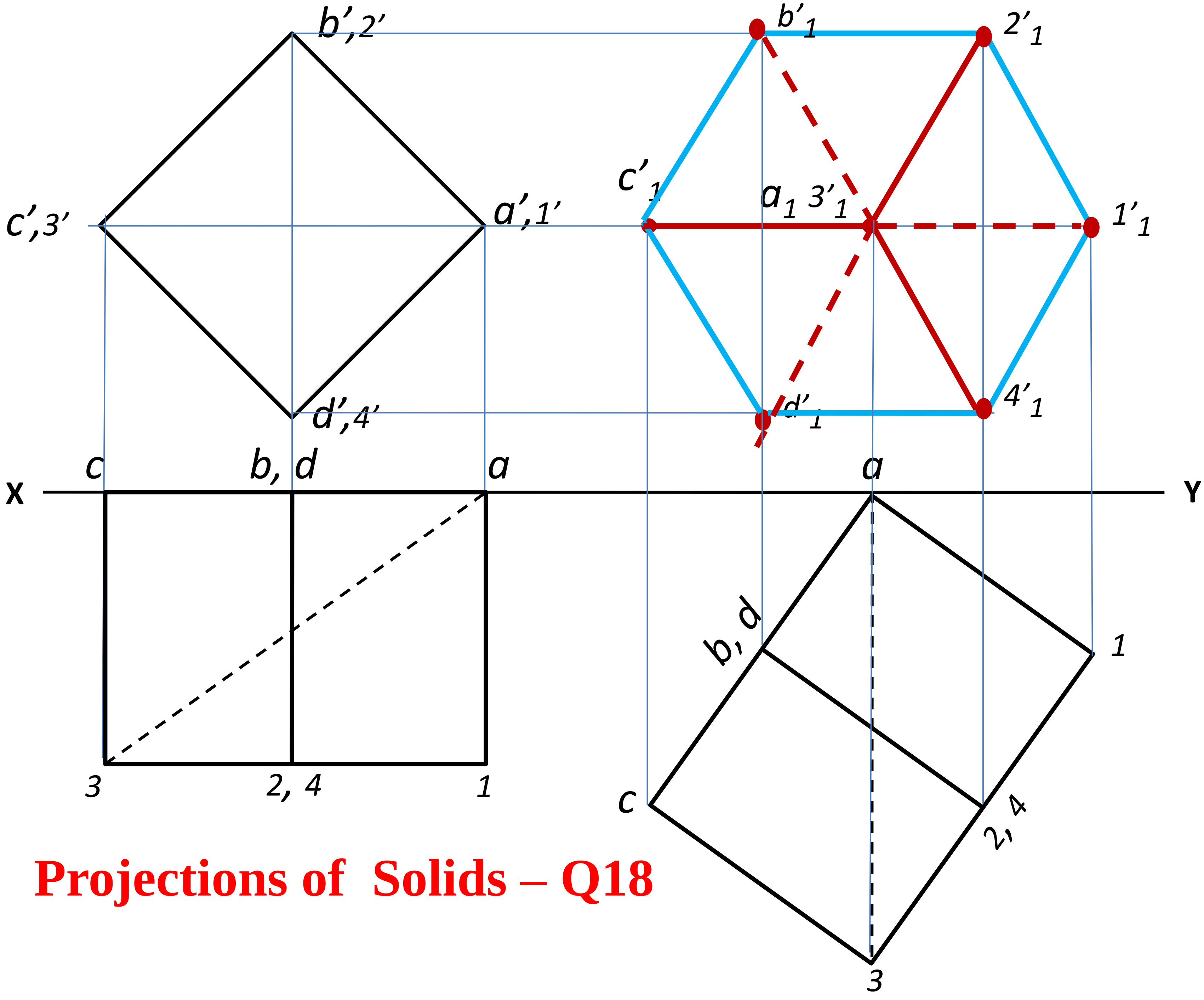
Projections of Solids – Q18

A cube of 50 mm edge resting on one of its corners on VP. Draw the projections of the cube when the body diagonal of the cube is perpendicular to VP.

Fig(1): ***FV in CORNER Position***

Fig(3): ***(1) a on XY.***

(2) a - 3 (The TV of the Body diagonal) Perpendicular to XY.



Projections of Solids – Q18

Projections of Solids – Q19

Draw the projections of a cube of 50 mm edge resting on one of its corners on HP when a body diagonal of the cube is perpendicular to VP.

Fig(1): *TV in CORNER Position*

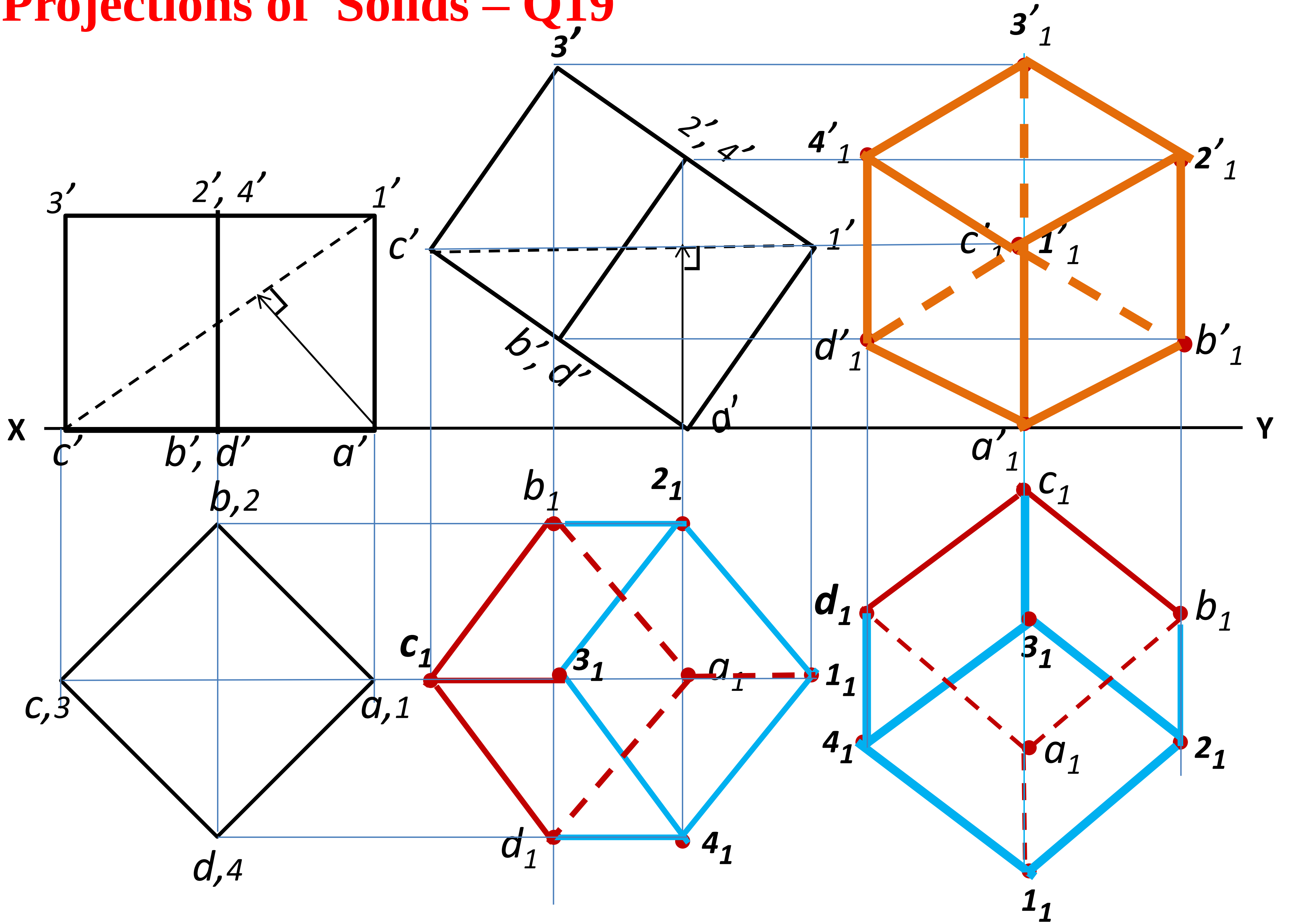
Fig(3): *(1) a' on XY.*

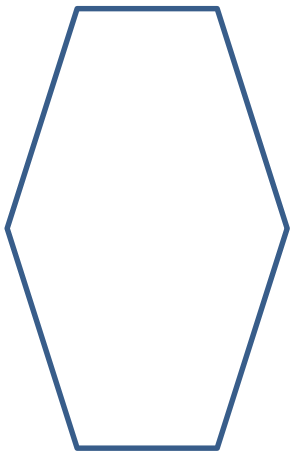
(2) c'- 1' (The FV of a Body diagonal NOT through a') parallel to XY.

Fig(5): c_1- 1_1 *Perpendicular to XY.*

Confirm : c_1- 1_1 *is in TL*

Projections of Solids – Q19





Pyramid

1. A triangular face on VP

2.
a). FV of Axis inclined to XY
b). Axis inclined to HP
c). Plane ⊥ to VP & containing the axis inclined to HP
d). FV, of axis appears inclined to HP
e). Base edge on VP inclined to HP

Pyramid

1. A triangular face on HP

2.
a). TV of Axis inclined to XY
b). Axis inclined to VP
c). Plane ⊥ to HP & containing the axis inclined to VP
d). TV, of axis appears inclined to HP
e). Base edge of the triangular face on HP, inclined to VP

Pyramid

1. Freely suspended from a corner of base.

.

3.
- a). TV of Axis inclined to XY
- b). Axis inclined to VP
- c). Plane ⊥ to HP & containing the axis inclined to VP
- d). TV, of axis appears inclined to VP

Pyramid

1. A corner of base on HP

2. Axis inclined to HP

3.
   a). TV of Axis inclined to XY

   b). Axis inclined to VP

   c). Plane ⊥ to HP & containing the axis inclined to VP

   d). TV, of axis appears inclined to VP

Pyramid

1. A corner of base on VP

2. Axis inclined to VP

3. a). FV of Axis inclined to XY

   b). Axis inclined to HP

   c). Plane ⊥ to VP & containing the axis inclined to HP

   d). FV, of axis appears inclined to HP

Fig(1). – FV – Base in true shape – (a’ b’) ⊥ to XY
FV of slant edges
Fig(2). – TV –TV of all base corners on XY
Fig(3). – TV – position w r t VP –(a b) on XY &
TV of axis inclined to XY (True inclination)
Fig(2) & Fig(3) are of same shape
Fig(4). – FV – All the lines in the solid are to be shown
(visible / invisible)
Fig(5). – FV – position w r t HP – copy paste Fig(4).
Fig(6). – TV – All the lines in the solid are to be shown
(visible / invisible)

BASE EDGE ON HP

Fig(1). – TV – Base in true shape – (a b) ⊥ to XY

TV of slant edges

Fig(2). – FV – FV of all base corners on XY

Fig(3). – FV – position w r t HP –(a’ b’) on XY &

FV of axis inclined to XY (True inclination)

Fig(2) & Fig(3) are of same shape

Fig(4). – TV – All the lines in the solid are to be shown

(visible / invisible)

Fig(5). – TV – position w r t VP – copy paste Fig(4).

Fig(6). – FV – All the lines in the solid are to be shown

(visible / invisible)

QUESTION - 8

A hexagonal pyramid base 30 mm side and axis 70 mm long has one of its triangular faces on VP. A plane containing the axis is perpendicular to V P and inclined at 45^0 to H P. Draw its projections when the apex is away from H P.

Triangular face on VP.

Fig (1) . FV – In Triangular face position (Base edge position)
– hexagon of 30 mm side with diagonals inside.

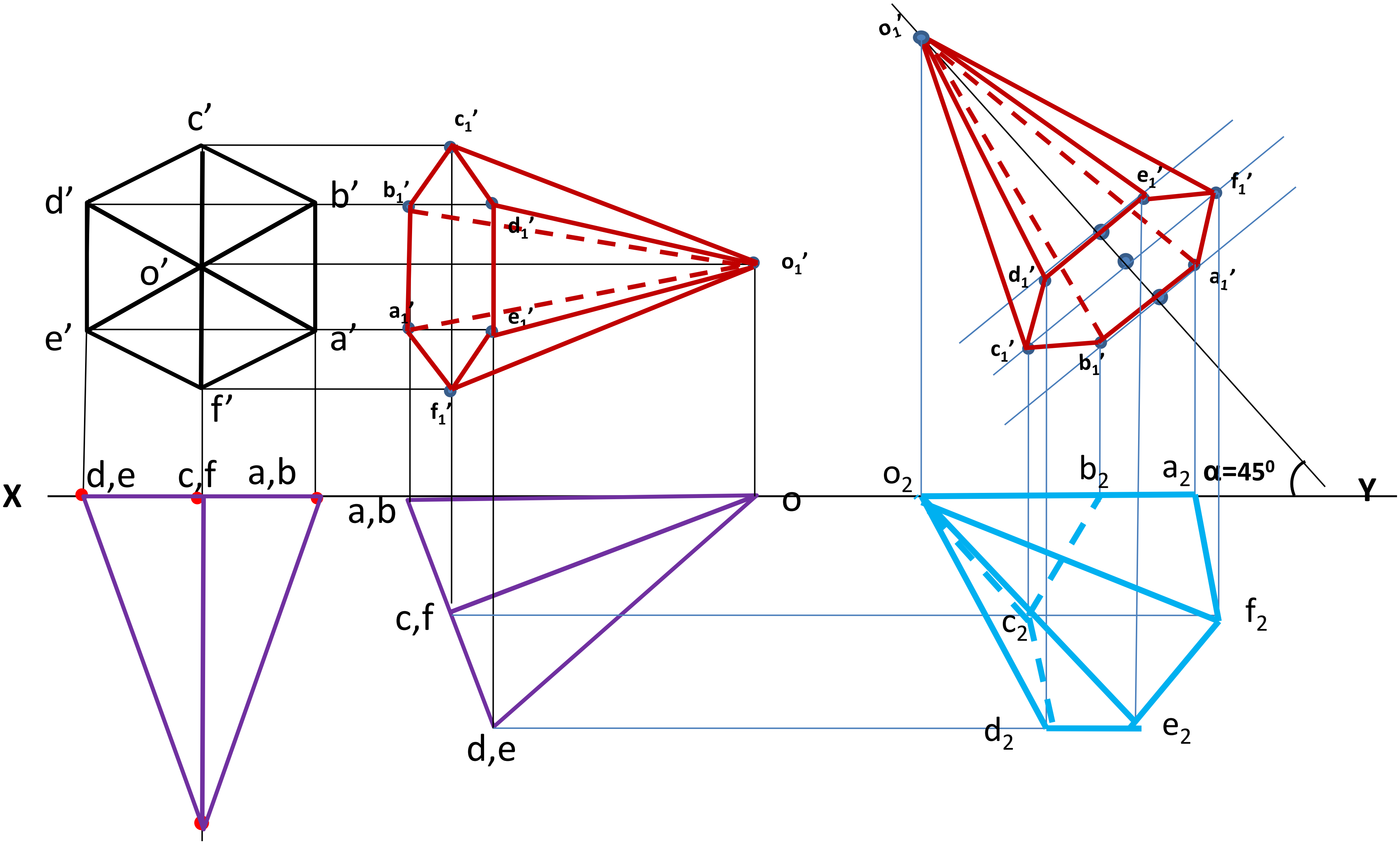
Fig (2) . TV – (a, b), c, d, e, & f on XY.

Fig (3) . TV – o a b on XY.

Fig(4). FV – All the lines in the solid are to be shown
(visible / invisible)

Fig(5). FV – ϴ(the given plane) = α(axis) = 45^0
& o' away from XY

Fig(6). TV –All the lines in the solid are to be shown
(visible / invisible)


c'
d'
b'
o'
e'
a'
f'
c_1'
b_1'
d_1'
o_1'
a_1'
e_1'
f_1'
d,e
c,f
a,b
X
a,b
o
c,f
d,e
o
o_1'
e_1'
f_1'
d_1'
a_1'
c_1'
b_1'
o_2
b_2
a_2
$\alpha=45^0$
Y
f_2
c_2
d_2
e_2

Pyramid

1. One Base edge on VP

2. Axis inclined to VP

3.
a). FV of Axis inclined to XY
b). Axis inclined to HP
c). Plane ⊥ to VP & containing the axis inclined to HP
d). FV, of axis appears inclined to HP
e). Base edge on VP inclined to HP

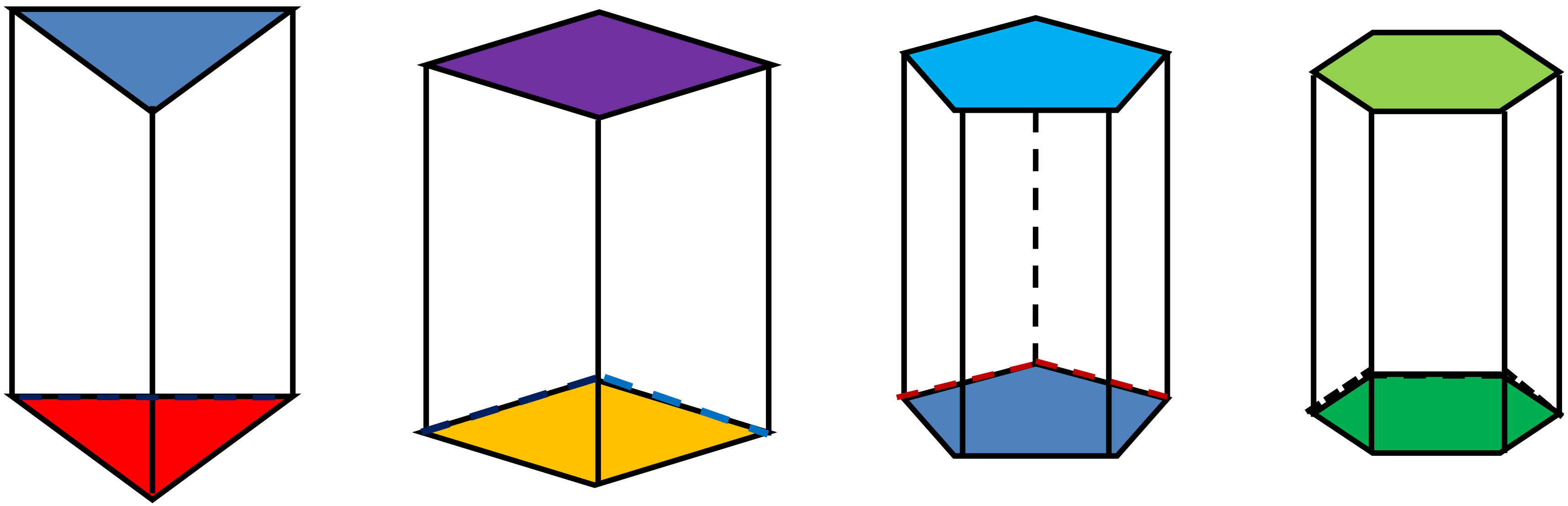
Pyramid

1. One Base edge on HP

2. Axis inclined to HP

3.
   - a). TV of Axis inclined to XY
   - b). Axis inclined to VP
   - c). Vertical plane containing the axis inclined to VP
   - d). TV, of axis appears inclined to VP
   - e). Base edge on HP inclined to VP

Prisms



Triangular **Square** **Pentagonal** **Hexagonal**

a 1

1 2 3 4 5 6 7 8 a b c d e f g h 1’ 2’ 3’ 4’ 5’ 6’ 7’ 8’ a, b’ c’ d’ e’ f’ g’ h’

b2

f6

$\mathbf{c_2}$ c3

d4 e5

6’ 3’ 5’ $\mathbf{d_2}$

$\mathbf{b_2}$

f’

4’ 1’ 2’

$\mathbf{e_2}$

$\mathbf{f_2}$

d’ e’ g’

$\mathbf{a_2}$

$\mathbf{1_2}$

a’

h’

b’

c’’

$\mathbf{2_2}$

$\mathbf{5_2}$

$\mathbf{3_2}$

$\mathbf{6_2}$

$\mathbf{4_2}$