

Name : Chapter Based Worksheet

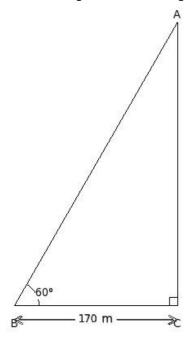
Chapter: Heights and Distances

Grade: ICSE Grade X

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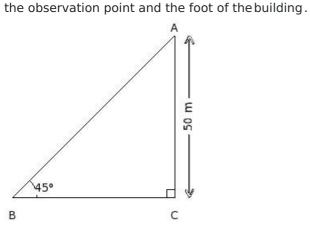
Abuilding stands vertically on the ground. From a point on the ground, the angle of elevation of the top of the

1. building is found to be  $60^{\circ}$ . If the distance between the point and the foot of the building is 170 m, find the height of the building.



- (i)  $170\sqrt{18}\,\text{m}$  (ii)  $255\sqrt{2}\,\text{m}$  (iii)  $510\,\text{m}$  (iv)  $170\sqrt{3}\,\text{m}$  (v)  $170\,\text{m}$
- 2. A man in a boat rowing away from a lighthouse 45 m high, takes 3 min to change the angle of elevation of the top of the lighthouse from 45° to 30°. Find the speed of the boat.
  - (i) 0.18 m/sec (ii) 8.18 m/sec (iii) 1.18 m/sec (iv) 7.18 m/sec (v) 2.18 m/sec

Abuilding stands vertically on the ground. From a point on the ground, the angle of elevation of the top of the 3. building is found to be  $45^{\circ}$ . If the height of the building is 50 m, find the distance between

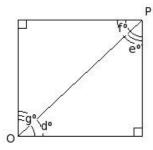


(i)  $48\,\mathrm{m}$  (ii)  $53\,\mathrm{m}$  (iii)  $51\,\mathrm{m}$  (iv)  $49\,\mathrm{m}$  (v)  $50\,\mathrm{m}$ 

The angles of depression of two boats from the top of a cliff 190 m high are  $30^{\circ}$  and  $35^{\circ}$  respectively. Find the distance between the boats, if the boats are on the same side of the cliff .

					Fro	m Tabl	e of Na	tural T	angent	s					
l.	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'   4	' 5'
	60	1.7321	1.7391	1.7461	1.7532	1.7603	1.7675	1.7747	1.7820	1.7893	1.7966	12	24	36 4	8 60
					Fro	m Tabl	e of Na	tural Ta	angent	S					
	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	21 3	3' 4	5'
	55	1.4281	1.4335	1.4388	1.4442	1.4496	1.4550	1.4605	1.4659	1.4715	1.4770	9 :	18 2	27 36	45

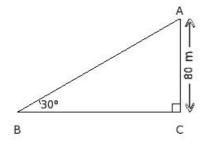
- (i) 62.76 m (ii) 60.76 m (iii) 52.76 m (iv) 57.76 m (v) 54.76 m
- 5. If P is the point of observation and the observed object is at point O, which of the following angles represent the angle of depression ?



4

(i) ∠e (ii) ∠g (iii) ∠d (iv) ∠f

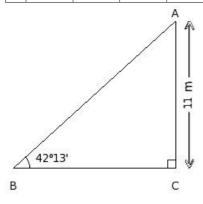
Aradio towerstands vertically on the ground. From a point on the ground, the angle of elevation of the top of the 6. radio tower is found to be 30°. If the height of the radio tower is 80 m, find the distance between the observation point and the top of the radio tower.



- (i) 157 m (ii) 163 m (iii) 160 m (iv) 161 m (v) 159 m
- 7. A man 1.5 m tall stands at a distance of 4.5 m from a lamp post and casts a shadow of 3.7 m on the ground. Find the height of the lamp post .
  - (i) 4.32 m (ii) 3.32 m (iii) 1.32 m (iv) 2.32 m (v) 5.32 m

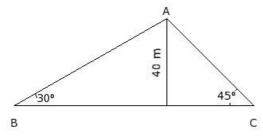
A pole stands vertically on the ground. From a point on the ground, the angle of elevation of the top of the pole is found to be 42°13'. If the height of the pole is 11 m, find the distance between the observation point and the foot of the pole.

•					Fro	m Table	e of Na	tural Ta	angent	S						
8.	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	4'	5'
	42	0.9004	0.9036	0.9067	0.9099	0.9131	0.9163	0.9195	0.9228	0.9260	0.9293	5	11	16	21	27
					Fre	om Tab	le of N	atural S	Sines							
	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3' 4	l' 5	<u> </u>
	42	0.6691	0.6704	0.6717	0.6730	0.6743	0.6756	0.6769	0.6782	0.6794	0.6807	2	4	6 9	9 1	1



(i) 17.13 m (ii) 15.13 m (iii) 12.13 m (iv) 9.13 m (v) 7.13 m

9. Two boys are on opposite sides of a tower of 40 m height. They measure the angle of elevation of the top of the tower as 30° and 45° respectively. Find the distance between the two boys.



(i)  $(40\sqrt{3}+40)$  m (ii) 3200 m (iii)  $(40\sqrt{18}+40\sqrt{6})$  m (iv)  $(60\sqrt{2}+20\sqrt{6})$  m (v)  $(2+\sqrt{3})$  m

A man in a boat rowing away from a lighthouse 35 m high, takes 3.5 min to change the angle of elevation of the top of the lighthouse from 25° to 22°. Find the speed of the boat.

					Fror	n Table	of Nat	tural Ta	ngents	5					
10.	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	l'   5'
	22	0.4040	0.4061	0.4081	0.4101	0.4122	0.4142	0.4163	0.4183	0.4202	0.4224	3	7	10 1	3 17
					Fror	n Table	of Nat	tural Ta	ngents	5					
	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3' 4	l'   5'
	25	0.4663	0.4684	0.4706	0.4727	0.4748	0.4770	0.4791	0.4813	0.4834	0.4856	4	7	11 1	4 18

(i) 8.06 m/sec (ii) 1.06 m/sec (iii) 7.06 m/sec (iv) 2.06 m/sec (v) 0.06 m/sec

Two poles of equal height are standing opposite to each other on either side of a road which is 10 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 21°42' and 25°31' respectively. Find the height of each pole and the distances of the point from the two poles .

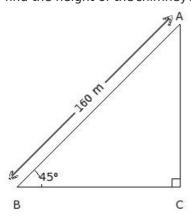
					Fror	n Table	of Nat	tural Ta	ngents	5						
11.	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	4'	5'
	21	0.3839	0.3859	0.3879	0.3899	0.3919	0.3939	0.3959	0.3979	0.4000	0.4020	3	7	10	13	17
					Fror	n Table	of Nat	tural Ta	ngents	5						
	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	4'	5'
	25	0.4663	0.4684	0.4706	0.4727	0.4748	0.4770	0.4791	0.4813	0.4834	0.4856	4	7	11	14	18

(i) height = 4.17 m, distances away = 6.55 m, 7.45 m (ii) height = 2.17 m, distances away = 4.55 m, 5.45 m

(iii) height = 0.17 m, distances away = 2.55 m, 3.45 m (iv) height = 1.17 m, distances away = 3.55 m, 4.45 m

(v) height = 3.17 m, distances away = 5.55 m, 6.45 m

- Achimney stands vertically on the ground. From a point on the ground, the angle of elevation of the top of the
- 12. chimney is found to be 45°. If the distance between the point and the top of the chimney is 160 m, find the height of the chimney.



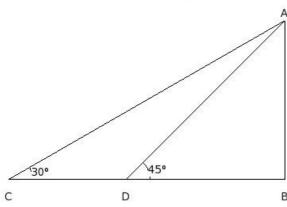
(i)  $160\,\mathrm{m}$  (ii)  $80\,\sqrt{2}\,\mathrm{m}$  (iii)  $40\,\sqrt{12}\,\mathrm{m}$  (iv)  $80\,\mathrm{m}$  (v)  $160\,\sqrt{3}\,\mathrm{m}$ 

An aeroplane is flying horizontally 900 m above the ground. From a point of observation, which lies exactly below the path of the aeroplane, the angle of elevation at a certain instant is  $58^{\circ}$ . After 50 sec , its elevation from the same point changes to  $36^{\circ}$ . Find the uniform speed of the aeroplane .

10					Fron	n Table	of Nat	tural Ta	angents	5						
13.	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	4'	5'
	36	0.7265	0.7292	0.7319	0.7346	0.7373	0.7400	0.7427	0.7454	0.7481	0.7508	5	9	14	18	23

				Fro	m Tabl	e of Na	tural T	angent	S						
χ°	0'	6'	12'		24'	00	36'		_	54'	1				
58	1.6003	1.6066	1.6128	1.6191	1.6255	1.6319	1.6383	1.6447	1.6512	1.6577	11	21	32	43	53

- (i) 48.70 kmph (ii) 43.70 kmph (iii) 45.70 kmph (iv) 51.70 kmph (v) 53.70 kmph
- A person, walking 50 m from a point toward a flagpost , observes that its angle of elevation changes from 30° to 45°. Find the height of the flagpost .



(i)  $1250 \,\mathrm{m}$  (ii)  $(25\sqrt{18}+25\sqrt{6}) \,\mathrm{m}$  (iii)  $(2+\sqrt{3}) \,\mathrm{m}$  (iv)  $(\frac{75}{2}\sqrt{2}+\frac{25}{2}\sqrt{6}) \,\mathrm{m}$  (v)  $(25\sqrt{3}+25) \,\mathrm{m}$ 

At the foot of a mountain, the elevation of its summit is 47°. After ascending 700 m towards the mountain up an incline of 25°, the elevation changes to 60°. Find the height of the mountain.

				Fro	m Tabl	e of Na	tural T	angent	S						
χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	4'	5'
47	1.0724	1.0761	1.0799	1.0837	1.0875	1.0913	1.0951	1.0990	1.1028	1.1067	6	13	19	25	32
				Fro	m Tabl	e of Na	tural T	angent	S						
χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	4'	5'
60	1.7321	1.7391	1.7461	1.7532	1.7603	1.7675	1.7747	1.7820	1.7893	1.7966	12	24	36	48	60
				Fror	n Table	of Nat	tural Co	sines							
χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	21 3	3' 4'	5'	
25	0.9063	0.9056	0.9048	0.9041	0.9033	0.9026	0.9018	0.9011	0.9003	0.8996	1	3 4	4 5	7	
				Fr	om Tab	le of N	atural	Sines							
χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	213	3' 4	'   5	·
25	0.4226	0.4242	0.4258	0.4274	0.4289	0.4305	0.4321	0.4337	0.4352	0.4368	3	5 8	3 1:	1 13	3

(i) 1435.37 m (ii) 1305.37 m (iii) 1455.37 m (iv) 1145.37 m

The angles of depression of two boats from the top of a cliff 140 m high are 39° and 27° respectively. Find the distance between the boats, if the boats are on the opposite sides of the cliff .

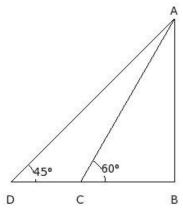
					Froi	m Tabl	e of Na	tural Ta	angent	S						
16.	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	4' l	5'
	51	1.2349	1.2393	1.2437	1.2484	1.2527	1.2572	1.2617	1.2662	1.2708	1.2753	8	15	23 3	30 3	38
					Fro	m Tabl	e of Na	tural T	angent	s						
	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	4'	5'
	63	1.9626	1.9711	1.9797	1.9883	1.9970	2.0057	2.0145	2.0233	2.0323	2.0413	15	29	44	58	73

(i) 447.65 m (ii) 470.65 m (iii) 420.65 m (iv) 462.65 m (v) 433.65 m

17. From the top of a 13 m high building, the angle of elevation of the top of a cable tower is 45° and the angle of depression of its foot is 30°. Find the height of the cable tower.

(i) 40.51 m (ii) 35.51 m (iii) 30.51 m (iv) 32.51 m (v) 38.51 m

18. The shadow of a vertical tower BA on a level ground is increased by 30 m, when the altitude of the sun changes from 60° to 45°. Find the height of the tower .



15.

(i) 73.98 m (ii) 75.98 m (iii) 65.98 m (iv) 67.98 m (v) 70.98 m

Two vertical poles are on either side of a road. A 33 m long ladder is placed between the two poles. When the 19. ladder rests against one pole, it makes an angle of 60° with the pole and when it is turned to rest against another pole, it makes an angle of 30° with the road. Find the width of the road.

(i) 45.08 m (ii) 40.08 m (iii) 50.08 m (iv) 42.08 m (v) 48.08 m

20. is found to be  $\cos^{(-1)}(\frac{1}{2})$ . If the distance between the point and the foot of the tower is 60 m,

find the distance between the observation point and the top of the tower.

(i) 126.00 m (ii) 116.00 m (iii) 92.00 m (iv) 120.00 m (v) 138.00 m

A flag is hoisted at the top of a building . From a point on the ground, the angle of elevation of the top of the flag staff is  $47^{\circ}11'$  and the angle of elevation of the top of the building is  $27^{\circ}14'$ . If the height of the flag staff is 14 m, find the height of the building .

					Fron	n Table	e of Na	tural Ta	angents	5					
21.	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1' 2	2' 3'	4'	5'
	27	0.5095	0.5117	0.5139	0.5161	0.5184	0.5206	0.5228	0.5250	0.5272	0.5295	4	7   11	15	18
					Fro	m Tabl	e of Na	tural T	angent	S					
	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2' 3'	4'	5'
	17	1 0724	1 0761	1 0700	1 0027	1 0975	1 0013	1 0051	1 0000	1.1028	1 1067	6	12 10	125	22

(i) 7.76 m (ii) 9.76 m (iii) 17.76 m (iv) 12.76 m (v) 15.76 m

Two vertical poles are on either side of a road. A 22 m long ladder is placed between the two poles. When the ladder rests against one pole, it makes an angle of 45°33' with the pole and when it is turned to rest against another pole, it makes an angle of 46°37' with the road. Find the width of the road.

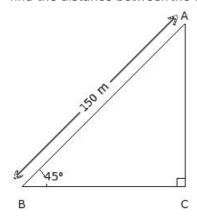
22					Froi	n Table	of Na	tural Co	osines							
22.	χ°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	4'	5'
	45	0.7071	0.7059	0.7046	0.7034	0.7022	0.7009	0.6997	0.6984	0.6972	0.6959	2	4	6	8	10
					Froi	n Table	e of Na	tural Co	osines							
	x°	0'	6'	12'	18'	24'	30'	36'	42'	48'	54'	1'	2'	3'	4'	5'
	46	0.6947	0.6934	0.6921	0.6909	0.6896	0.6884	0.6871	0.6858	0.6845	0.6833	2	4	6	9	11

(i) 30.52 m (ii) 27.52 m (iii) 35.52 m (iv) 33.52 m (v) 25.52 m

A man on the top of a vertical observation tower observes a car moving at a uniform speed coming directly 23. towards him. If it takes 11 min for the angle of depression to change from 30° to 60°, how soon after this, will the car reach the observation tower?

(i) 2 min 28 sec (ii) 8 min 32 sec (iii) 5 min 30 sec (iv) 4 min 29 sec (v) 6 min 31 sec

Achimney stands vertically on the ground. From a point on the ground, the angle of elevation of the top of the 24. chimney is found to be 45°. If the distance between the point and the top of the chimney is 150 m, find the distance between the observation point and the foot of the chimney.



(i)  $150 \, \text{m}$  (ii)  $75 \, \sqrt{2} \, \text{m}$  (iii)  $\frac{75}{2} \, \sqrt{12} \, \text{m}$  (iv)  $150 \, \sqrt{3} \, \text{m}$  (v)  $75 \, \text{m}$ 

There are two temples one on each bank of a river, just opposite to each other. One of the temples is 20 m high.

25. As observed from the top of this temple, the angles of depression of the top and foot of the other temple are 45° and 60° respectively. Find the width of the river.

(i) 6.55 m (ii) 11.55 m (iii) 16.55 m (iv) 8.55 m (v) 14.55 m

		Д	ssignment Key		
1) (iv)	2) (i)	3) (v)	4) (iv)	5) (iv)	6) (iii)
7) (ii)	8) (iii)	9) (i)	10) (v)	11) (ii)	12) (ii)
13) (i)	14) (v)	15) (ii)	16) (i)	17) (ii)	18) (v)
19) (i)	20) (iv)	21) (iv)	22) (i)	23) (iii)	24) (ii)
25) (ii)					

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