CHAPTER ONE. A SKYSCRAPER.

SET 1. Mr. Wood and his partner, Ms. Glass, has just completed building an extremely large building, called The TOWERS. Calculate the length of the building program if the following tasks were completed in secession. The building has 9 floors and 4 lifts. Remember that plans, etc. are only prepared once.

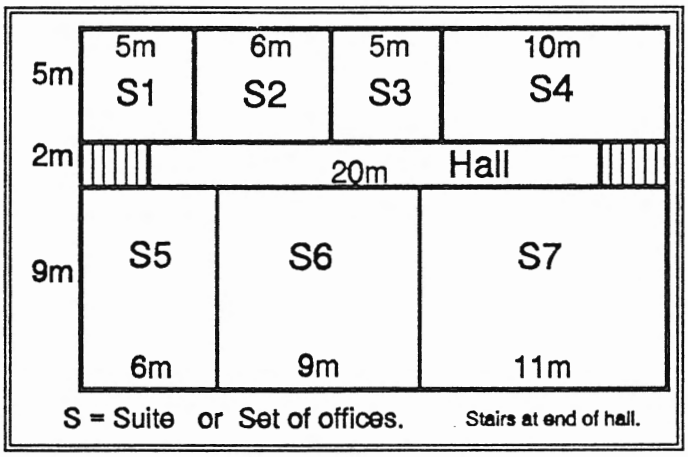
Task	Weeks used	No.of Times	Total Weeks	Costs Each	Total Cost
Preparing the plans	24			$ 45000	
Getting plans approved	12			$ 32000	
Digging foundations	16			$ 72000	
Pouring foundations	4			$ 63000	
Building a floor	9			$ 93400	
Fitting a floor	6			$ 10450	
Painting a floor	3			$ 8655	
Clearing a floor	4			$ 6782	
Carpeting a floor	2			$ 23470	
Installing each lift	7			$ 45678	
Testing the lifts	4			$ 9856	
		TOTAL		TOTAL	

SET 2. The measurements of the ground floor of THE TOWERS are 30m by 20m. As you progress up the building the length and breath are both reduced by 2m for each floor. Hence, the dimensions of the first floor are 18m by 28m, the second floor 16m by 26m, etc. Find (a) the perimeter of each floor (to lay telephone cable around the floor); (b) the area of each floor (to lay carpet) and (c) the DECREASE floor area from one floor to the next.

Floor	Length	Breadth	Perimeter	Area	DECREASE
Ground					
First					
Second					
Third					
Fourth					
Fifth					
Sixth					
Seventh					
Eight					

SET 3. Using the answers obtained in SET 2 find the cost of laying the telephone cable at $ 9 a metre on all floors and the cost of carpeting each floor. The cost of the carpet differs for each floor.

Floor	Perimeter of floor	Cost Cable per floor	Area of floor	Carpet $ per m	Carpet Total Cost
Ground				$ 500	
First				$ 700	
Second				$ 90	
Third				$ 200	
Fourth				$ 400	
Fifth				$ 80	
Sixth				$ 600	
Seventh				$ 800	
Eight				$ 1100	



SET 4. Examine the offices illustrated in the opposite diagram.

What is the width of the hall ? [_____]

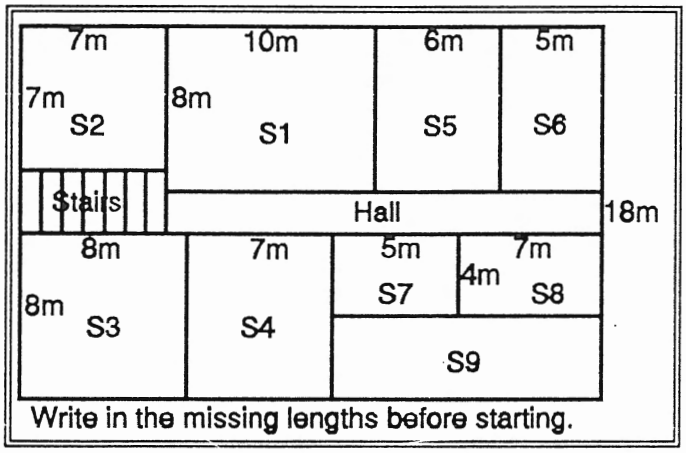
For this floor, what is the

(a) length ? [_____]
(b) breadth? [_____]

Which floor is this ?
[_____]

All these spaces are either SQUARES or RECTANGLES.
Complete the following table.

Space	Length	Breadth	Perimeter	Area	Figure Type
S1					
S2					
S3					
S4					
Hall					
S5					
S6					
S7					



SET 5. Examine the offices illustrated in the opposite diagram.

What are the dimensions of the hall ? [_____]

For this floor, what is the

(a) length ? [_____]
(b) breath ? [_____]

Which floor is this ?
[_____]

Calculate the cost of renting each suite at $ 40 a square metre.

Suite	Length	Breadth	Perimeter	Area	Cost Renting
S1					
S2					
S3					
S4					
Hall					
S5					
S6					
S7					
S8					
S9					
Stairs					

SET 6. The suites of this floor are 2 metres high. Hence calculate the cubic metres of air in each office space. Remember to multiple the length x breadth x height.

Space	Length	Breadth	Height	Volume	Units
S1					cubic metres
S2					
S3					cu. m
S4					
Hall					metres cubed
S7					
S9					

SET 7. Calculate the volume of air in the given suites.

	Length	Breadth	Height	Volume		Length	Breadth	Height	Volume
1	8 m	6 m	2 m		8	9 m	4 m	3 m	
2	9 m	7 m	2 m		9	7 m	5 m	3 m	
3	7 m	5 m	2 m		10	6 m	6 m	4 m	
4	8 m	8 m	2 m		11	8 m	11 m	5 m	
5	11 m	3 m	5 m		12	8 m	11 m	5 m	
6	10 m	4 m	2 m		13	4 m	7 m	4 m	
7	13 m	6 m	7 m		14	4 m	7 m	4 m	

SET 8. The office spaces in THE TOWER are rented at a rate related both to their floor area and the frequency of the payment of the rent.

Space	Time	Rent
Large	Weekly	$ 460
	Monthly	$ 2090
	Yearly	$ 22650
Medium	Weekly	$ 340
	Monthly	$ 1164
	Yearly	$ 12456
Small	Weekly	$ 280
	Monthly	$ 987
	Yearly	$ 9752

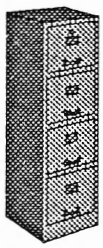
(i) Examine the table above and fill in the table below.

No	Space	Time	Rent/Unit	Total Rent
1	Small	2 weeks		
2	Large	3 years		
3	Medium	3 weeks		
4	Medium	5 years		
5	Small	8 months		
6	Large	9 months		
7	Medium	10 months		
8	Large	4 years		
9	Medium	5 years		
10	Small	7 months		
11	Medium	8 months		
12	Large	4 weeks		
13	Medium	6 years		
14	Large	7 months		

(ii) How much extra does a client pay in 1 year if he rents per week nstead of er year.

Large Sp	Prices
Yearly Weekly	
Extra	
Medium Sp	
Yearly Weekly	
Extra	
Small Sp	
Yearly Weekly	
Extra	

SET 9. Many rooms in THE TOWERS are leased as offices. By addition, find the length of the wall required to house the following combinations of filing cabinets. All the measurements are in metres.



File One is abbreviated to F.1, etc.

	Executive Offices					Secretary Offices				
No	F.1	F.2	F.3	F.4	LENGTH	F.1	F.2	F.3	F.4	LENGTH
1	1.2	0.6	0.5	2.7		1.7	0.7	2.4	0.8	
2	1.6	.8	.7	3.3		2.2	1.0	1.2	.6	
3	2.5.	1.1	.8	2.8		1.3	.8	2.1	.8	
4	3.6	1.4	.6	1.4		2.8	.9	3.2	1.3	
5	4.5	1.3	1.1	3.9		3.2	1.2	1.8	1.8	
6	4.7	1.4	3.6	1.3		4.8	1.5	3.6	4.7	
7	3.5	1.6	4.5	1.4		7.8	2.3	2.5	5.4	
8	6.3	1.5	3.7	2.5		9.8	2.5	4.6	2.4	
9	8.4	1.8	4.6	2.2		8.8	2.7	7.2	3.7	
10	7.3	2.4	6.8	3.1		9.5	2.3	4.6	2.6	
11	8.4	1.6	3.5	7.8		6.8	3.2	8.9	1.1	
12	7.4	2.1	5.9	1.6		4.7	1.4	6.6	1.8	
13	4.6	1.9	4.4	1.1		8.8	2.4	7.3	7.8	

SET 10. Calculate the length of timber left when the given pieces are cut from a full length.

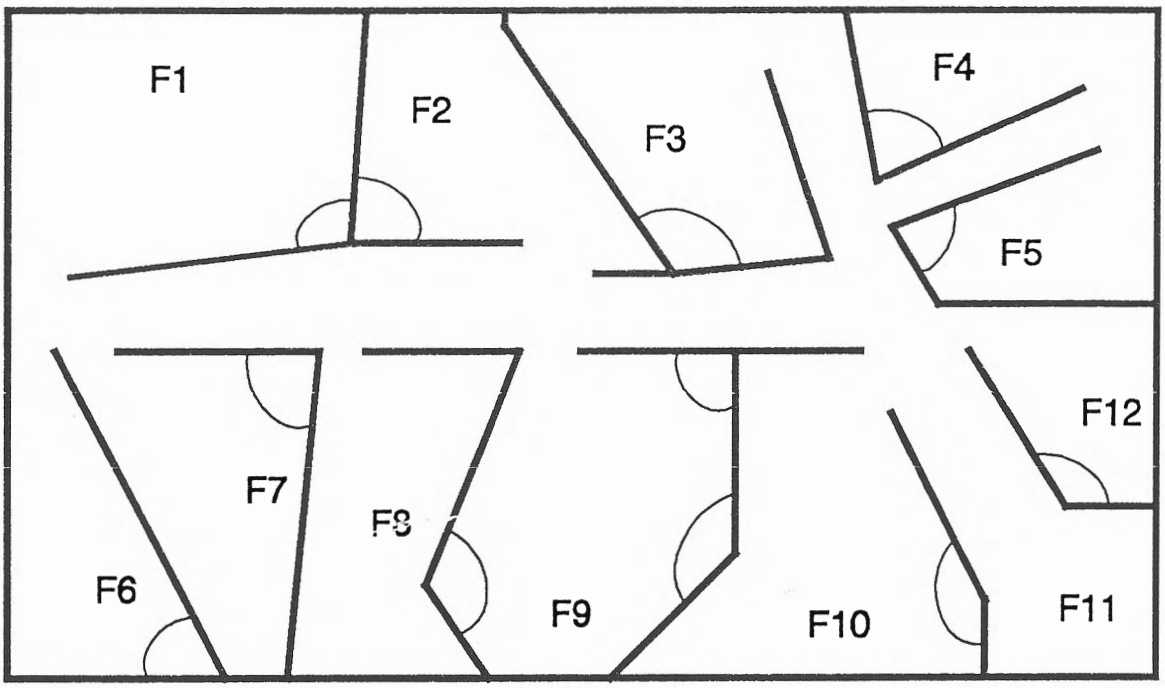
Full length Cut piece	8.6m 2.4m	9.8m 6.7m	12.8m 4.6m	15.7m 6.6m	16.6m 8.5m	28.9m 12.7m
Metres left						
Full length Cut piece	8.3m 2.7m	6.4m 3.7m	11.5m 4.7m	17.3m 6.8m	12.2m 8.5m	25.4m 13.7m
Metres left						
Full length Cut piece	8.64m 6.77m	6.93m 2.78m	34.7m 13.6m	89.5m 79.7m	34.1m 16.8m	65.9m 38.7m
Metres left						
Full length Cut piece	7.8 m 4.55m	5.5 m 3.18m	45.3 m 12.85m	21.7 m 8.96m	63.9 m 34.45m	37.4 m 31.82m
Metres left						

SET 11. In building the frames for high-rise buildings, steel rods are welded together or cut off to create the cages for pouring the concrete. Calculate the lengths of each rod when another piece has been welded on or cut off.

	Rod 1	Rod 2	Rod 3	Rod 4	Rod 5
Length	2.6 m	5.2 m	5.68 m	8.7 m	78.6 m
Added	2.6 m	3.75 m	3.8 m	4.56 m	16.8 m
New length					
Removed	2.8 m	6.9 m	7.08 m	9.65 m	9.79 m
New length					
Added	5 m	5.32 m	8.2 m	7.77 m	12.4 m
New length					
Removed	3.15 m	4.32 m	6.4 m	6.5 m	15.29 m
New length					
Added	6.8 m	8.8 m	9.74 m	9.3 m	8.9 m
New length					
Removed	1.76 m	5.68 m	8.24 m	6.75 m	31.28 m
New length					
Added	5.09 m	6.78 m	6.4 m	8.82 m	7.6 m
New length					
Removed	4.3 m	3.9 m	8.88 m	9.07 m	42.88 m
New length					
Added	3.78 m	7.88 m	3.07 m	8.5 m	9.6 m
Length					

SET 12. The calculations, required to calculate the strength of the concrete and steel needed in building THE TOWERS, are complex and involved. Assist Ms. GLASS by determining the numbers in the following sentences.

1	[ ] + 73 = 100	[ ] =	13	74 + x = 131	x =
2	67 - [ ] = 50	[ ] =	14	80 - [ ] = 45	[ ] =
3	6 [ ] = 120	[ ] =	15	7 x = 35	x =
4	[ ] / 4 = 13	[ ] =	16	x / 9 = 8	x =
5	86 + [ ] = 100	[ ] =	17	34 + x = 82	x =
6	[ ] - 14 = 62	[ ] =	18	82 - x = 12	x =
7	5 [ ] = 115	[ ] =	19	10 x = 610	x =
8	84 / [ ] = 21	[ ] =	20	17 - x = 11	x =
9	x + 34 = 56	x =	21	56 + y = 92	y =
10	45 + x = 68	y =	22	y + 73 = 120	y =
11	63 / [ ] = 21	[ ] =	23	36 / x = 12	x =
12	x + 33 = 98	x =	24	6 y = 72	y =



The Master Office in the Towers.

SET 13. Examine the sketch of the Master Office in THE TOWER.

(i) Use a protractor and measure the marked angles. Write the measurements on the diagram.

(ii) Where would you place a rectangular desk in each partitioned office from F1 to F12 ? Answer this question by drawing in the rectangles use a pencil and rule.

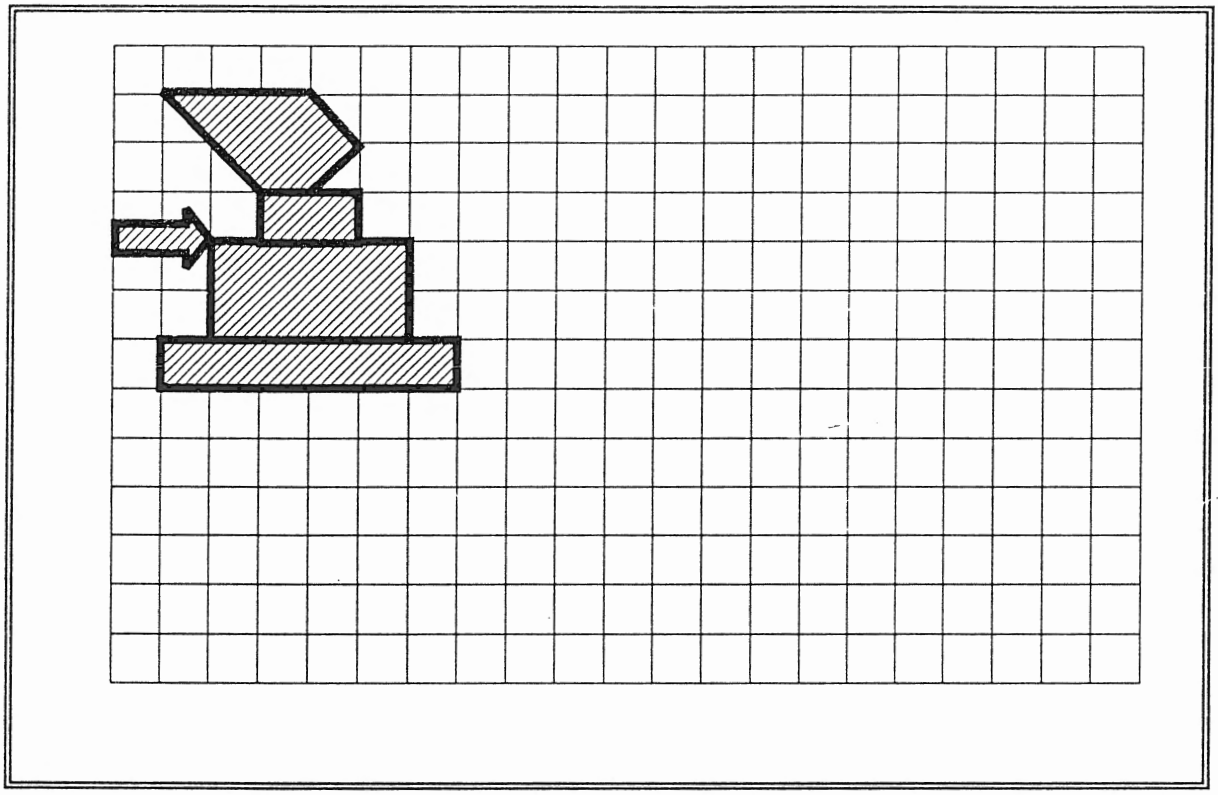
(iii) Which office is the Boss's ? Explain your answer.

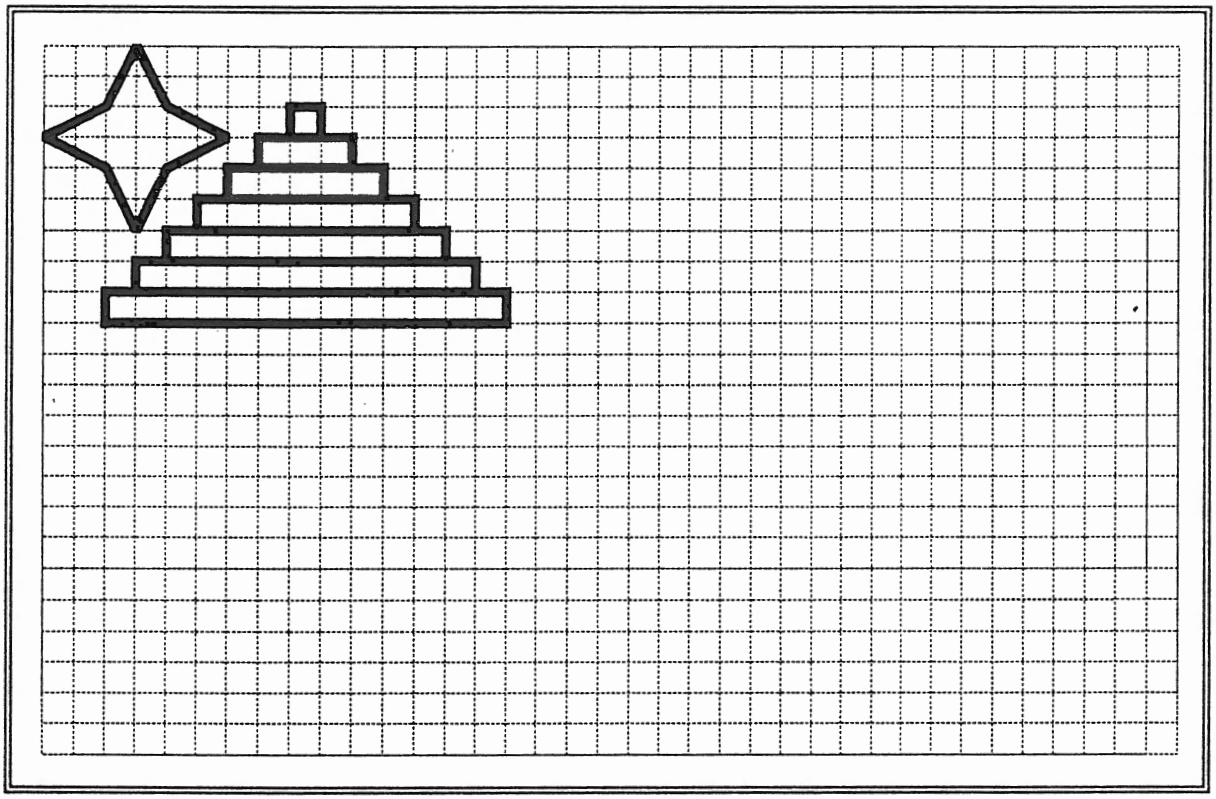
SET 14. Calculate the lease payable, in one year, by the following tenants in THE TOWERS.

Lease = Bond + Rate x No. of Payments + Maintenance

Name	Bond	Rate	No.of Pay-ts	Total Pay-ts	Maint.	Lease Total
James	$ 800	$ 350 a month			$ 680	
Kings	$ 950	$ 670 a quarter			$ 730	
Hunts	$ 746	$ 473 a month			$ 834	
Guys	$ 814	$ 527 a month			$ 904	
Tins	$ 692	$ 789 a quarter			$ 988	
Juds	$ 806	$ 996 a half			$ 784	
Hots	$ 736	$ 764 a month			$ 886	
Clips	$ 487	$ 400 a week			$ 785	
Seas	$ 809	$ 600 a week			$ 987	

SET 15. In order to draw plans for large buildings, Ms. Glass must be able to reproduce drawings to scale. Show Ms. Glass how to use a divider to enlarge drawing by reproducing the following drawings to twice their original size.



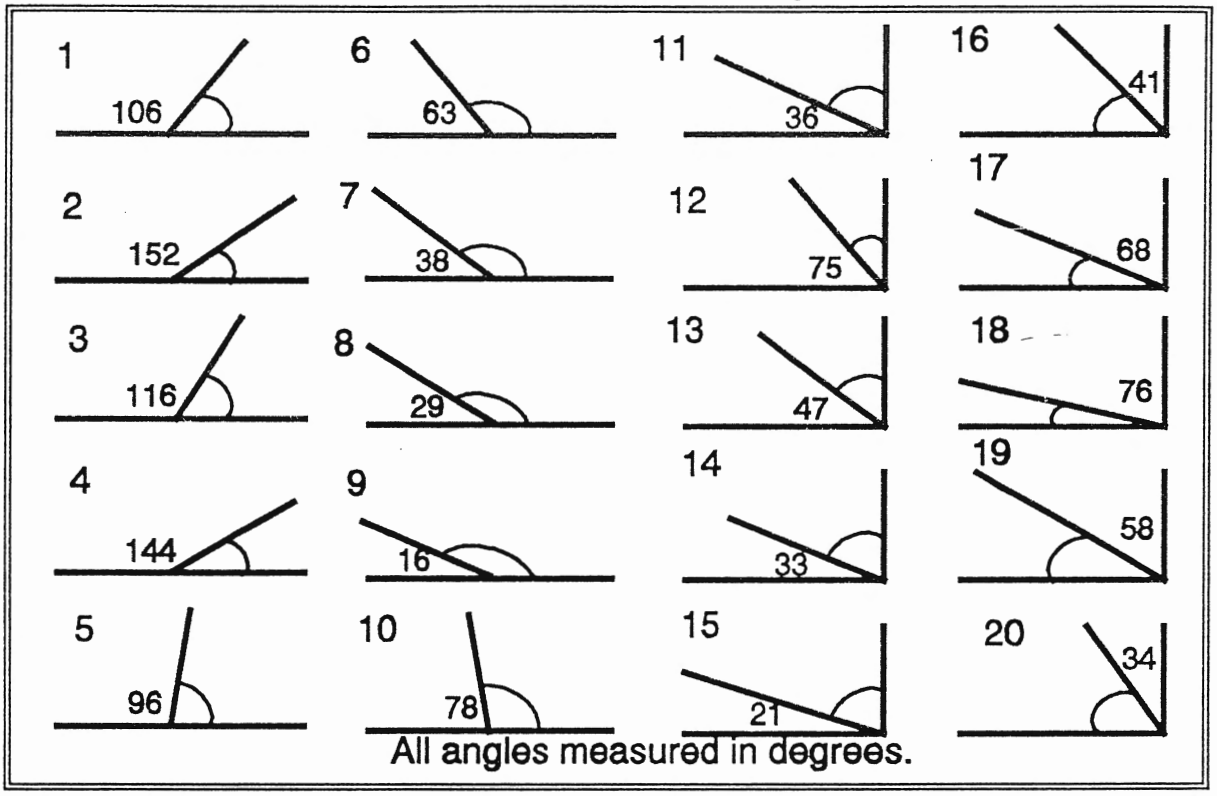


SET 16. Complete the table given

A = 48 B = 24 C = 6 D = 4 E = 3

A + B		AC		A/E		A - B		BC	
B + C		AD		B/D		C - E		AE	
A + C		BE		B/E		B - C		BE	

SET 17. Each of the following diagrams represent the doorway of a room in THE TOWERS. Each of these doorways has a restriction behind them, preventing them from opening completely. Calculate the sweep of each door and write the result on the diagram. Remember, unrestricted, a door will open 180 degrees or 90 depending on its position in relation to the walls. Write this sweep on the diagram.

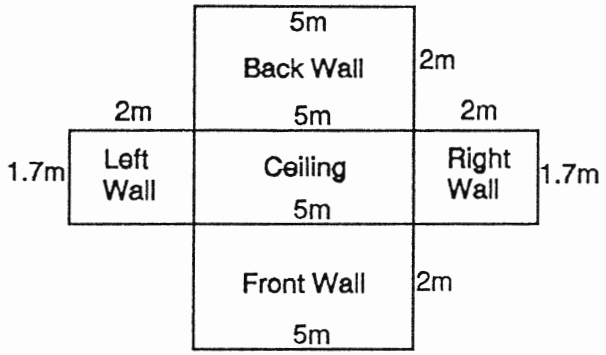


SET 18. Calculate the cost of fitting furniture into some of the offices in THE TOWERS. Refer to the Table of Values to obtain the prices.

Chair	$ 89.40
Desk	$ 234.78
Lamp	$ 67.82
Files	$ 183.57
Rug	$ 106.56

Off.	Chairs	Desks	Lamps	Files	Rugs	Total
A	1	1	1	1	1	
B	2	2	3	2	2	
C	5	3	2	4	3	
D	7	4	6	6	8	
E	9	5	7	3	4	
F	8	6	4	5	7	
G	6	7	5	7	5	
H	3	8	9	8	9	
I	8	9	8	9	6	

SET 19. Draw the opposite figure on cardboard. Use a set of dividers and double its size as you draw it onto cardboard. Cut out the figure. Fold the sides and fix the solid together with tape. Place the shape with the open end down on your desk. You have just created a model of an office. For this model, fill in the following tables.



Length =	Breadth =	Height =

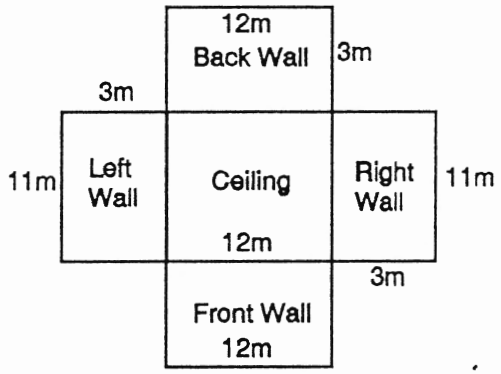
Face	Length	Breadth	Area
Left Wall Right Wall Front Wall Back Wall			
TOTAL SURFACE AREA			

$\text{Volume}_{\text{AIR}}$ = L x B x H

= _____

= _____ m^3

SET 20. Repeat SET 19 using the diagram opposite and the following tables.



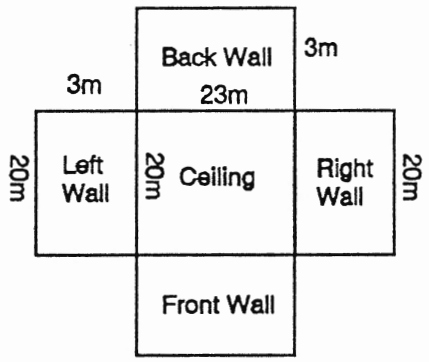
For this office,

L =	B =	H =

Face	L	B	Area
Left W Right W Front W Back W			
TOTAL SURFACE AREA			

$\text{VOLUME}_{\text{AIR}}$ = L x B x H = _____ m^3

SET 21. Repeat SET 19 using the diagram opposite and the following tables.



For this office,

L =	B =	H =

Face	L	B	Area
Left W Right W Front W Back W			
TOTAL SURFACE AREA			

$\text{VOLUME}_{\text{AIR}}$ = L x B x H = _____ m^3

SET 22. Calculate the total cost of painting the following rooms in THE TOWERS. After creating a cardboard model, use Table A to calculate the wall and ceiling areas. Then use Table B to calculate how many tins to buy and the total price of the paint.

TABLE A

Rm.	L	B	H	Area of Sides S1	S2	S3	S4	Area Ceiling	Total Area
1	4	5	2						
2	3	4	2						
3	6	5	2						
4	7	6	2						
5	9	4	2						
6	8	7	3						
7	9	3	3						
8	7	4	3						
9	5	5	3						
10	4	8	3						
11	7	6	2						
12	8	9	3						
13	7	5	3						
14	8	9	4						
15	5	8	4						

TABLE B

Rm.	Total Area	Coverage per tin	No. Tins exactly	No. Tins to buy	Cost a tin	Total Cost
1		8 sq.m			$ 45	
2		7 sq.m			$ 32	
3		4 sq.m			$ 37	
4		9 sq.m			$ 41	
5		6 sq.m			$ 56	
6		5 sq.m			$ 33	
7		8 sq.m			$ 57	
8		3 sq.m			$ 38	
9		7 sq.m			$ 44	
10		4 sq.m			$ 49	

Rm.	Total Area	Coverage	Exact No	True No.	Cost	Total
11		6 sq.m			$ 51	
12		4 sq. m			$ 38	
13		8 sq.m			$ 47	
14		5 sq.m			$ 62	
15		9 sq.m			$ 55	

SET 23. Mr. Wood is a very busy man. Hence, he uses shorthand to write some of his complex formulae. Examine the following shorthand and complete the table.

Expanded Form	Shorthand	Expanded Form	Shorthand
6x6x6x6	6^4	3x3x3x3x3	
7x7x7x7x7x7x7		5x5x5x5x5	
9x9x9		8x8	
4x4x4x4		2x2x2x2x2x2	
2x2x2x2x2x2x2		4x4x4x4	

SET 24. The cost of any major rebuilding program on any floor of THE TOWERS is a continued multiple of the cost on the ground floor. Examine the first two rows of the following table carefully and then complete the table.

Floor	Basic Factor	Floor Factor	Floor Total	Shorthand	Floor Cost	True Cost
3	2	2x2x2	8	2^3	$ 250	
7	2	2x2x2x2x2x2x2	128	2^7	$ 800	
2	2				$ 657	
4	2				$ 700	
6	2				$ 400	
8	2				$ 900	
5	2				$ 600	
2	3				$ 836	
3	3				$ 700	
4	3				$ 500	
5	3				$ 300	
2	4				$ 40	
3	4				$ 60	

SET 25. Calculate the rent per week for the following offices. Circle the cheapest rent for each floor.

Fl.	Option A	Option B	Option C	Option D
1	8 for $ 296	7 for $ 308	4 for $ 272	2 for $ 110
2	6 for $ 714	3 for $ 360	5 for $ 605	4 for $ 472
3	3 for $ 252	5 for $ 430	7 for $ 616	9 for $ 783
4	2 for $ 264	4 for $ 536	6 for $ 786	8 for $ 1088
5	5 for $ 320	8 for $ 544	4 for $ 264	7 for $ 434
6	6 for $ 762	4 for $ 512	9 for $ 1116	7 for $ 875
7	8 for $ 352	7 for $ 322	4 for $ 124	2 for $ 88
8	6 for $ 426	3 for $ 222	5 for $ 365	4 for $ 276
9	3 for $ 453	5 for $ 450	7 for $ 1064	9 for $ 1377
10	2 for $ 176	4 for $ 820	6 for $ 1254	8 for $ 1664
11	5 for $ 1665	8 for $ 2680	4 for $ 1336	7 for $ 2359
12	6 for $ 2772	4 for $ 1864	9 for $ 4212	7 for $ 3227

SET 26. Complete the following Practise Tables.

(i) ADDITION

+	27.5	4.68	56.9	8.96	98.9	8.95	70.2	37
4.8								
48								
67.6								
9.53								

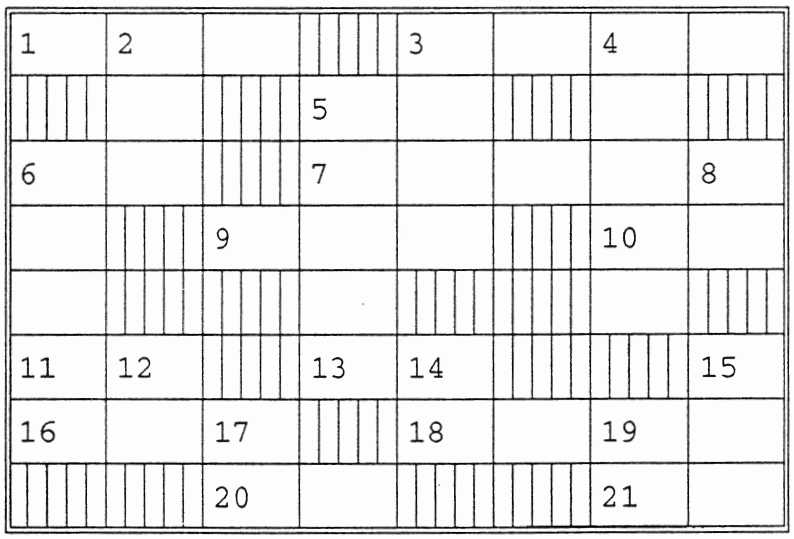
(ii) SUBTRACTION

-	14.6	9.86	23.8	10.07	89.3	9.65	46.1	16
7.4								
9.1								
0.65								

SET 27. Mr. Woods wants to erect an even bigger building, called SUPER TOWER. Calculate the new lengths required to achieve the given increase.

No	SIDE1	Increase Required	Actual Extra	New Length	SIDE2	Increase Required	Actual Extra	New Length
1	4.8m	1/4			2.45m	1/5		
2	3.6m	1/2			1.6m	1/4		
3	5.5m	1/5			2.5m	1/5		
4	0.46m	1/2			0.66m	1/2		
5	0.92m	1/4			14.4m	1/4		
6	1.36m	1/2			6.4m	1/4		
7	2.34m	1/3			0.45m	1/5		
8	1.55m	1/5			12.8m	1/4		
9	2.4m	1/4			6.2m	1/2		
10	7.8m	1/3			12.6m	1/6		
11	4.26m	1/3			3.0m	1/4		
12	8.4m	1/4			2.45m	1/5		

SET 28. Complete the following Cross Number.



Across

1) 8 x 50 + 13 x 13
3) 2140 - 60 x 15
5) 6 x 11 + (22 / 2)
6) (22 + 40 + 19) / 3
7) 21789 + 26287
9) 4180 / 5
10) 8 x 10 - 4
11) 4 x 7 - 5 x 2
13) Square of 5
16) 800 - 157
18) 21 x 300 - 184
20) 415 / 5
21) 1/2 of 16 + 5

Down

2) (237 + 370)
3) 35720 / 20
4) 2611 x 8 x 2
5) 9299 x 8
6) 24338 + 1478
8) 132 / 4 + 33
12) 7 x 6 + 6 x 7
14) 5 x 8 + 2 x 8
15) 30 x 20 - 137
17) 4 x 6 + 2 x 7
19) 32 - 17 - 4