

# My Mathematics Rule Booklet

Grade 4-6



Name: \_\_\_\_\_

Grade: \_\_\_\_\_

Hoo-hoo Wiskunde ©

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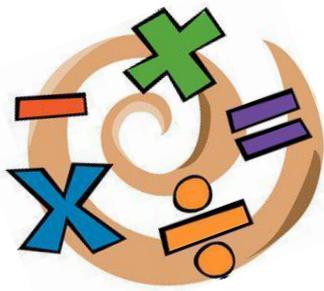
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# Numbers, Operations & Relationships



## I.1 WHOLE NUMBERS

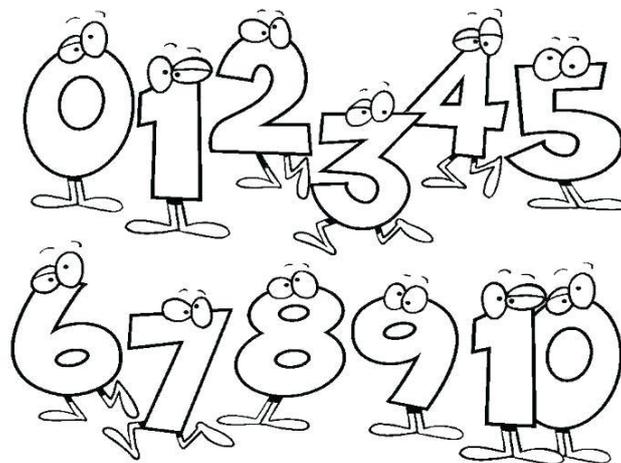
### I. Number names

Number	English	Afrikaans
1	one	een
2	two	twee
3	three	drie
4	four	vier
5	five	vyf
6	six	ses
7	seven	sewe
8	eight	agt
9	nine	nege
10	ten	tien
20	twenty	twintig
30	thirty	dertig
40	forty	veertig
50	fifty	vyftig
60	sixty	sestig
70	seventy	sewentig
80	eighty	tagtig
90	ninety	negentig
100	one hundred	eenhonderd
200	two hundred	tweehonderd
300	three hundred	driehonderd
400	four hundred	vierhonderd
500	five hundred	vyfhonderd
600	six hundred	seshonderd
700	seven hundred	sewehonderd
800	eight hundred	agthonderd
900	nine hundred	negehonderd
1000	thousand	eenduisend
2000	two thousand	tweeduisend
3000	three thousand	drieduisend
4000	four thousand	vierduisend
5000	five thousand	vyfduisend
6000	six thousand	sesduisend
7000	seven thousand	seweduisend
8000	eight thousand	agtduisend
9000	nine thousand	negeduisend
10000	ten thousand	tienduisend

## 2. Counting:

### Counting 1- 200:

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200



## Counting 1-1000:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280
281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300
301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320
321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340
341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380
381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460
461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500

501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520
521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540
541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560
561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580
581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600
601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620
621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640
641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680
681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700
701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720
721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740
741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760
761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780
781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800
801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820
821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840
841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860
861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880
881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900
901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920
921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940
941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960
961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980
981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000

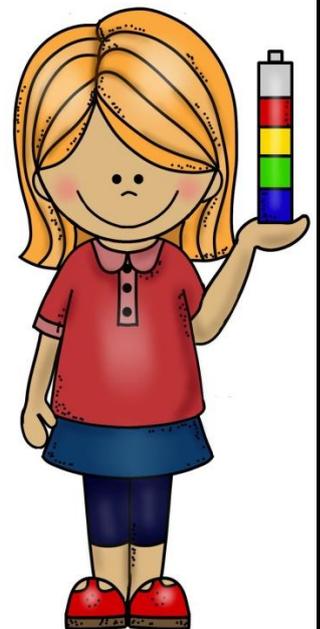
### 3. Time Tables: x2 - x12

X 2	X 3	X 4
$1 \times 2 = 2$	$1 \times 3 = 3$	$1 \times 4 = 4$
$2 \times 2 = 4$	$2 \times 3 = 6$	$2 \times 4 = 8$
$3 \times 2 = 6$	$3 \times 3 = 9$	$3 \times 4 = 12$
$4 \times 2 = 8$	$4 \times 3 = 12$	$4 \times 4 = 16$
$5 \times 2 = 10$	$5 \times 3 = 15$	$5 \times 4 = 20$
$6 \times 2 = 12$	$6 \times 3 = 18$	$6 \times 4 = 24$
$7 \times 2 = 14$	$7 \times 3 = 21$	$7 \times 4 = 28$
$8 \times 2 = 16$	$8 \times 3 = 24$	$8 \times 4 = 32$
$9 \times 2 = 18$	$9 \times 3 = 27$	$9 \times 4 = 36$
$10 \times 2 = 20$	$10 \times 3 = 30$	$10 \times 4 = 40$
$11 \times 2 = 22$	$11 \times 3 = 33$	$11 \times 4 = 44$
$12 \times 2 = 24$	$12 \times 3 = 36$	$12 \times 4 = 48$

X 5	X 6	X 7
$1 \times 5 = 5$	$1 \times 6 = 6$	$1 \times 7 = 7$
$2 \times 5 = 10$	$2 \times 6 = 12$	$2 \times 7 = 14$
$3 \times 5 = 15$	$3 \times 6 = 18$	$3 \times 7 = 21$
$4 \times 5 = 20$	$4 \times 6 = 24$	$4 \times 7 = 28$
$5 \times 5 = 25$	$5 \times 6 = 30$	$5 \times 7 = 35$
$6 \times 5 = 30$	$6 \times 6 = 36$	$6 \times 7 = 42$
$7 \times 5 = 35$	$7 \times 6 = 42$	$7 \times 7 = 49$
$8 \times 5 = 40$	$8 \times 6 = 48$	$8 \times 7 = 56$
$9 \times 5 = 45$	$9 \times 6 = 54$	$9 \times 7 = 63$
$10 \times 5 = 50$	$10 \times 6 = 60$	$10 \times 7 = 70$
$11 \times 5 = 55$	$11 \times 6 = 66$	$11 \times 7 = 77$
$12 \times 5 = 60$	$12 \times 6 = 72$	$12 \times 7 = 84$

X 8	X 9	X 10
$1 \times 8 = 8$	$1 \times 9 = 9$	$1 \times 10 = 10$
$2 \times 8 = 16$	$2 \times 9 = 18$	$2 \times 10 = 20$
$3 \times 8 = 24$	$3 \times 9 = 27$	$3 \times 10 = 30$
$4 \times 8 = 32$	$4 \times 9 = 36$	$4 \times 10 = 40$
$5 \times 8 = 40$	$5 \times 9 = 45$	$5 \times 10 = 50$
$6 \times 8 = 48$	$6 \times 9 = 54$	$6 \times 10 = 60$
$7 \times 8 = 56$	$7 \times 9 = 63$	$7 \times 10 = 70$
$8 \times 8 = 64$	$8 \times 9 = 72$	$8 \times 10 = 80$
$9 \times 8 = 72$	$9 \times 9 = 81$	$9 \times 10 = 90$
$10 \times 8 = 80$	$10 \times 9 = 90$	$10 \times 10 = 100$
$11 \times 8 = 88$	$11 \times 9 = 99$	$11 \times 10 = 110$
$12 \times 8 = 96$	$12 \times 9 = 108$	$12 \times 10 = 120$

X 11	X 12
$1 \times 11 = 11$	$1 \times 12 = 12$
$2 \times 11 = 22$	$2 \times 12 = 24$
$3 \times 11 = 33$	$3 \times 12 = 36$
$4 \times 11 = 44$	$4 \times 12 = 48$
$5 \times 11 = 55$	$5 \times 12 = 60$
$6 \times 11 = 66$	$6 \times 12 = 72$
$7 \times 11 = 77$	$7 \times 12 = 84$
$8 \times 11 = 88$	$8 \times 12 = 96$
$9 \times 11 = 99$	$9 \times 12 = 108$
$10 \times 11 = 110$	$10 \times 12 = 120$
$11 \times 11 = 121$	$11 \times 12 = 132$
$12 \times 11 = 132$	$12 \times 12 = 144$



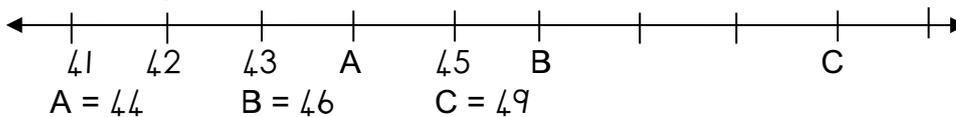
4. Time Table grid

X	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

## 5. Numbers

- Positive numbers: Collection of all positive numbers, except 0: {1, 2, 3, 4, 5, 6, 7 ...}
- Whole numbers: Whole numbers are the numbers starting at 0 and counting up forever. Whole numbers don't include negative numbers, fractions, or decimals. {0, 1, 2, 3, 4, 5, 6, 7, 8, 9...}
- Integers: Integers are just like whole numbers, but they also include negative numbers. Like whole numbers, integers don't include fractions or decimals. {... -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5...}

### Placing numbers on a number line



## 6. Expanded notation

Expanded notation means to expand the number in its simplest form. There are three ways to expand numbers.

- ✓  $168 = 100 + 60 + 8$
- ✓  $168 = 1\text{H} + 6\text{T} + 8\text{U}$
- ✓  $168 = (1 \times 100) + (6 \times 10) + (8 \times 1)$

## 7. Value and place value

- a) Value: The value of a certain number is what it is worth (NUMBER) e.g.  $1\underline{2}6 = 20$
- b) Place value: Place value can be defined as the value represented by a digit in a number on the basis of its position in the number. (NAME) e.g.  $1\underline{2}6 = \text{tens or T}$

### Place values you should know:

Place value	Abbreviation	Value
Billion	B	1000000000
Hundred million	HM	100000 000
Ten million	TM	10000000
Million	M	1000 000
Hundred Thousand	HT	100000
Ten Thousand	TT	10000
Thousand	Th	1000
Hundred	H	100
Ten	T	10
Ones	O	1
tenths	t	0.1
hundredths	h	0.01
thousands	th	0.001

Build your own numbers under the right place value:

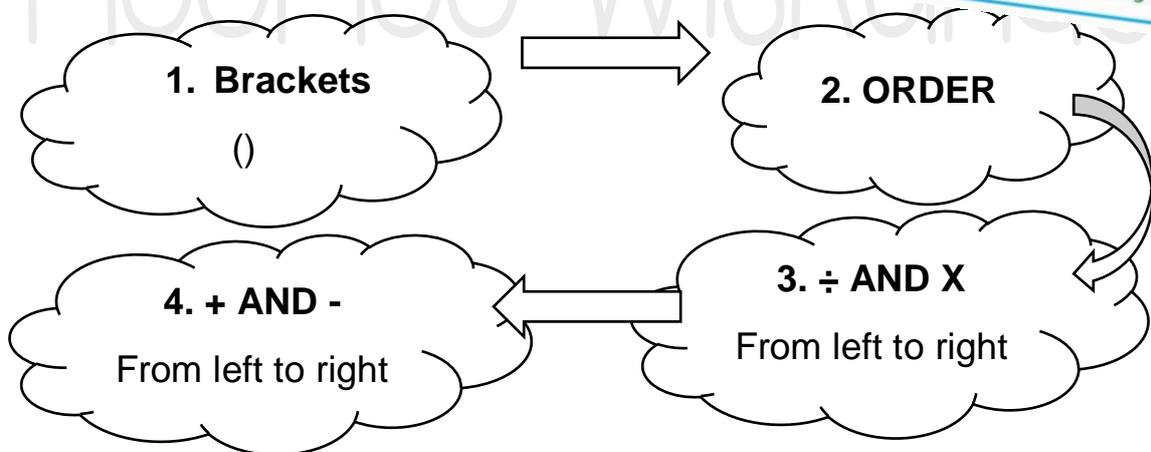
M	HT	TT	Thh	H	T	O

8. Order of operation

**BODMAS:**

Brackets, order, division, multiplication, addition and subtraction.

<b>B</b>	<b>Brackets</b>	$10 \times (4 + 2) = 10 \times 6 = 60$
<b>O</b>	<b>Order</b>	$5 + 2^2 = 5 + 4 = 9$
<b>D</b>	<b>Division</b>	$10 + 6 \div 2 = 10 + 3 = 13$
<b>M</b>	<b>Multiplication</b>	$10 - 4 \times 2 = 10 - 8 = 2$
<b>A</b>	<b>Addition</b>	$10 \times 4 + 7 = 40 + 7 = 47$
<b>S</b>	<b>Subtraction</b>	$10 \div 2 - 3 = 5 - 3 = 2$



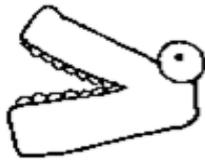
9. Odd and even numbers

Even numbers: All numbers that can be divided by two without any remainder. All the even numbers end with a 2, 4, 6, 8 or a 0.

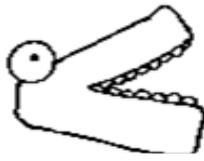
Odd numbers: All numbers with a remainder of one as it is divided by two. All odd numbers end with a 1, 3, 5, 7 or a 9.

## 10. Greater than, less than and equal to

The crocodile was very hungry. He always wants to eat the most, so always write its mouth open to the greatest number.



greater than



less than

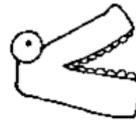


Equal to



21

85



90

### **GREATER THAN**

The open side is always faced to the largest number  
e.g.:

- $2 > 1$
- $170 > 120$
- $7 \times 3 > 2 \times 8$

### **LESS THAN**

The closed end always faced to the smallest number  
e.g.:

- $3 < 6$
- $10 < 19$
- $287 < 387$

### **EQUAL TO**

If both numbers are equal, e.g.:

- $16 = 16$
- $10 + 4 = 12 + 2$
- $2 \times 4 = 4$

## 11. Between numbers

### A) Numbers between two tenths

- 67 - between 60 and 70
- 289 - between 280 and 290

### B) Numbers between two hundreds

- 148 - between 100 and 200
- 1126 - between 1100 and 1200

### C) Numbers between two thousands

- 10025 - 10 000 to 11 000
- 286 245 - between 286 000 and 287 000

### D) Which number is exactly between two numbers:

Find the difference between the two numbers, then divide the answer by 2. Subtract the result from the largest number and add the answer to the smallest number.

E.g. What number is exactly between 684 and 452

1.  $684 - 452 = 232$
2.  $232 \div 2 = 116$
3.  $684 - 116 = 568$
4.  $452 + 116 = 568$
5. The number is 568.

~ 15 ~

## 12. Double and halve

Double: Twice as many

Double 14:

$$\begin{array}{r} 10 + 4 \\ \downarrow \quad \downarrow \\ 20 + 8 = 28 \end{array}$$

Double 185:

$$\begin{array}{r} 100 + 80 + 5 \\ \downarrow \quad \downarrow \quad \downarrow \\ 200 + 160 + 10 = 370 \end{array}$$

Halve, is divided by 2

Halve of 16:

$$\begin{array}{r} 10 + 6 \\ \downarrow \quad \downarrow \\ 5 + 3 = 8 \end{array}$$

Halve of 365

$$\begin{array}{r} 300 + 60 + 5 \\ \downarrow \quad \downarrow \quad \downarrow \\ 150 + 30 + 2\frac{1}{2} = 182\frac{1}{2} \end{array}$$

## 13. Compare and order

Use all the numbers 6; 3; 0; 6; 8 and build the:

a) smallest number- Arrange the numbers from smallest to largest, but zero may not be the first number. 30 668

b) largest number: Arrange the numbers from largest to smallest. 86 630

## 14. Ascending and descending order

a) **DECREASING**: When the airplane is about to land from the air, we can see that it is from the largest to the smallest number.



b) **ASCENDING**: When the airplane is about take-off from the bottom up, we can see that it is from the smallest to the largest number.



## 15. Rounding off

### ROUNDING TO THE NEAREST 5



If the ONES are 3, 4, 6 or 7, you round off to the nearest 5:  $46 \approx 45$

If the ONES are 1, 2, 8 or 9, you round off to the nearest 10:  $28 \approx 30$

### ROUNDING TO THE NEAREST 10

10 has 1 zero, so we look at the 1<sup>st</sup> digit from the right, which will be the ONES.

If the number is below the line 1-4 then it stays at the 10ths:  $72 \approx 70$

If the number is above the line 5-9, the 10ths adds one more:  $48 \approx 50$

### ROUNDING TO THE NEAREST 100

100 has 2 zeros, so we look at the second digit from the right, which will be the TENTHS.

If the number is below the line 10-40 then it stays at the 100s:  $146 \approx 100$

If the number is above the line 50-90, the 100s adds one more:  $762 \approx 800$

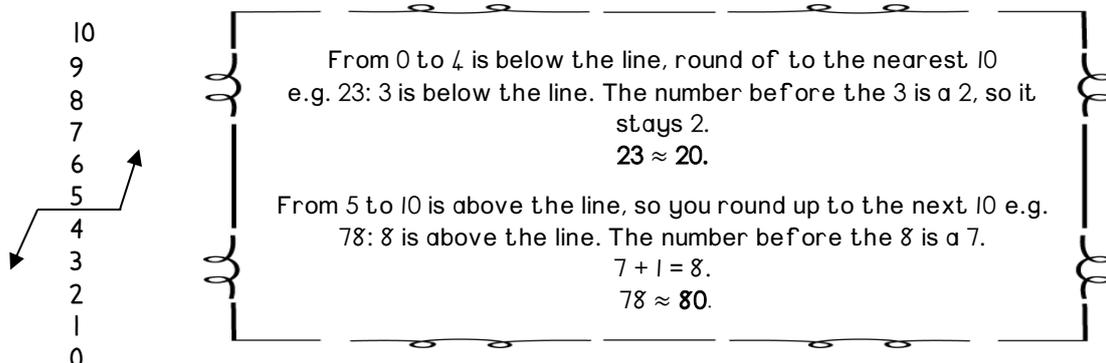
### ROUNDING TO THE NEAREST 1000

1000 has 3 zeros, so we look at the 3<sup>rd</sup> digit from the right, which will be the HUNDREDS.

If the number is below the line 100-400 then it stays at the 1000s:  $258 \approx 200$

If the number is above the line 500-900, the 1000s adds one more:  $861 \approx 1000$

### REMEMBER:



## 16. Characteristics of 0

- a) Any number multiplied by 0 is 0:  
 $11 \times 0 = 0$
- b) 0 divided by any number is 0:  
 $0 \div 8 = 0$
- c) Any number divided by 0 is undefined.  
 $60 \div 0 = \text{indefinitely}$
- d) Any number plus 0 stays the same number:  
 $186 + 0 = 186$
- e) Any number minus 0 stays the same number:  
 $23 - 0 = 23$
- f) 0 minus any number equals a negative number:  
 $0 - 15 = -15$

## 17. Characteristics of 1

- a) Any number multiplied by 1 remains the same number:  
 $5 \times 1 = 5$
- b) Any number that is divided by 1 remains the same number:  
 $12 \div 1 = 12$
- c) Any number plus 1 is a number more:  
 $15 + 1 = 16$
- d) Any number minus 1 is 1 less:  
 $28 - 1 = 27$

## 18. Addition and subtraction by breaking down numbers

### ADDITION:



$156 + 186 = \underline{\quad}$

$$\begin{aligned} 156 &= 100 + 50 + 6 \\ 186 &= 100 + 80 + 6 \\ 200 + 130 + 12 &= 342 \end{aligned}$$



$156 + 186 = \underline{\quad}$

$$\begin{aligned} 156 + (100 + 80 + 6) \\ &= 256 + (80 + 6) \\ &= 336 + 6 \\ &= 342 \end{aligned}$$



$156 + 186 = \underline{\quad}$

$$\begin{aligned} &= (100 + 50 + 6) + (100 + 80 + 6) \\ &= (100 + 100) + (50 + 80) + (6 + 6) \\ &= 200 + 130 + 12 \\ &= 342 \end{aligned}$$

## SUBTRACTION:

$$\blacksquare 478 - 256 = \underline{\quad}$$

$$\begin{aligned} 478 &= 400 + 70 + 8 \\ 256 &= 200 + 50 + 6 \\ 200 + 20 + 2 &= 222 \end{aligned}$$

$$\blacksquare 478 - 256 = \underline{\quad}$$

$$\begin{aligned} &= (400 + 70 + 8) - (200 + 50 + 6) \\ &= (400 - 200) + (70 - 50) + (8 - 6) \\ &= 200 + 20 + 2 \\ &= 222 \end{aligned}$$

$$\blacksquare 523 - 148 = \underline{\quad}$$

$$\begin{aligned} &= 523 - (100 + 40 + 8) \\ &= (523 - 100) - (40 + 8) \\ &= (423 - 40) - 8 \\ &= (383 - 8) \\ &= 375 \end{aligned}$$

## 19. Properties of whole numbers

### 1. Commutative property

- You can change the order of the numbers when adding or multiplying and the answer will not change.
- $7 + 6 = 6 + 7$
- $3 \times 2 = 2 \times 3$

### 2. Associative property

- It does not matter what set of the numbers are calculated first, the answer remains the same.
- $2 + 3 + 4 = (2 + 3) + 4 = 2 + (3 + 4)$
- $3 \times 4 \times 5 = (3 \times 4) \times 5 = 3 \times (4 \times 5)$

### 3. Distributive property

- The number outside the brackets is multiplied by each number within the brackets and the operator within the brackets are now between the brackets.
- $3(4 + 5)$   
 $= (3 \times 4) + (3 \times 5)$   
 $= 12 + 15$   
 $= 27$

## 20. Addition and subtraction in columns

Addition:

$$2683 + 1589 = \underline{\quad}$$

	Th	H	T	O
	2	6	8	3
+	1	5	8	9
	4	2	7	2

Subtraction:

$$8643 - 2658 = \underline{\quad}$$

	Th	H	T	O
	<del>8</del> <sup>7</sup>	<del>6</del> <sup>15</sup>	<del>4</del> <sup>13</sup>	3
-	2	6	5	8
	5	9	8	5

## 21. Multiplication by breaking down numbers

### STEPS:

STEP 1: Break down the numbers

STEP 2: Multiply the first digit in the first bracket with the second bracket's first digit

STEP 3: Multiply the first bracket's 1st number by the 2nd bracket's 2nd number

STEP 4: Multiply the first bracket 2nd number with the 2nd brackets' 1st number

STEP 5: Multiply the first bracket 2nd number with the 2nd brackets 2nd number

$$\begin{array}{r} 27 \times 16 \\ = (20 + 7) \times (10 + 6) \\ 20 \times 10 = 200 \\ 20 \times 6 = 120 \\ 7 \times 10 = 70 \\ 7 \times 6 = \underline{42} \\ 432 \end{array}$$

$$\begin{array}{r} 38 \times 24 \\ = (30 + 8) \times (20 + 4) \\ 30 \times 20 = 600 \\ 30 \times 4 = 120 \\ 8 \times 20 = 160 \\ 8 \times 4 = \underline{32} \\ 912 \end{array}$$

## 22. Division by breaking down numbers

### STEPS:

STEP 1: Break down the numbers in the first bracket

STEP 2: Divide the first bracket's 1st number with the number

STEP 3: Divide the first bracket 2nd number with the number

$$\begin{array}{l} 150 \div 25 = \\ (100 + 50) \div 25 \\ 100 \div 25 = 4 \\ 50 \div 25 = 2 \\ 4 + 2 = 6 \end{array}$$

$$\begin{array}{l} 576 \div 12 = 48 \\ (500 + 70 + 6) \div 12 \\ 500 \div 12 = 41 \text{ remainder } 8 \\ (70 + 8) \div 12 = 6 \text{ remainder } 6 \\ (6 + 6) \div 12 = 1 \\ 41 + 6 + 1 = 48 \end{array}$$

## 23. Multiplication column method

a)  $25 \times 2 = 50$

	T	O
	2	5
X		2
	5	0

STEP 1:  $2 \times 5 = 10$ . Write the last digit, 0 under the ONES

STEP 2: Transfer 1 of 10 to the TENS

STEP 3:  $2 \times 2 = 4$      $4 + 1 = 5$

STEP 4: Write 5 under the tens

b)  $24 \times 12 = 288$

	H	T	O
		2	4
X		1	2
		4	8
+	2	4	0
	2	8	8

STEP 1:  $2 \times 4 = 8$ . Write the 8 under the ONES

STEP 2:  $2 \times 2 = 4$ . Write the 4 down under the TENS

STEP 3: Write a 0 under the ONES in the second row as a place holder

STEP 4:  $1 \times 4 = 4$ . Write the 4 under the TENS

STEP 5:  $1 \times 2 = 2$ . Write 2 down under the HUNDREDS

STEP 6: Add the numbers

c)  $136 \times 124 = 16,864$

	HT	Th	H	T	O
			<sup>1</sup> 1	<sup>2</sup> 3	6
X			1	2	4
			5	4	4
		<sup>1</sup> 2	7	2	0
+	1	3	6	0	0
	1	6	8	6	4

STEP 1:  $4 \times 6 = 24$ . Write the 4 b under O and carry the 2 on the T

STEP 2:  $4 \times 3 + 2 = 14$ . Write the 4 under T and carry the 1 over to H

STEP 3:  $4 \times 1 = 4$   $4 + 1 = 5$ . Write 5 under H

STEP 4: Write a 0 under the O column as a place holder

STEP 5:  $2 \times 6 = 12$ . Write 2 under Th and carry the 1 over to H

STEP 6:  $2 \times 3 = 6$   $6 + 1 = 7$ . Write 7 under H

STEP 7:  $2 \times 1 = 2$ . Write two 0's under the ones and tens column as a place holder

STEP 8:  $1 \times 6 = 6$ . Write 6 under H

STEP 9:  $1 \times 3 = 3$ . Write 3 in Th

STEP 10:  $1 \times 1 = 1$ . Write 1 under HT

STEP 11: Add the numbers

## 24. Short- and Long division

a)  $125 \div 5 = 25$

$$\begin{array}{r} 25 \\ 5 \overline{) 125} \end{array}$$

MULTIPLES:

$5 \times 1 = 5$

$5 \times 2 = 10$

$5 \times 3 = 15$

$5 \times 4 = 20$

$5 \times 5 = 25$

STEP 1:  $1 \div 5 = x$

STEP 2:  $12 \div 5 = 2$

STEP 3: Write the 2 above 2

STEP 4:  $12 - 10 = 2$ , so the remainder is 2

STEP 5: Write the remainder next to 5 (now number 25)

STEP 6:  $25 \div 5 = 5$

STEP 7: Write the 5 above the 25

b)  $125 \div 5 = 25$

$$\begin{array}{r} 25 \\ 5 \overline{) 125} \\ \underline{- 10} \phantom{0} \\ 25 \\ \underline{- 25} \\ 00 \end{array}$$

<b>REMEMBER</b>	
Does - <b>DIVIDE</b>	
McDonalds - <b>MULTIPLY</b>	
Sell - <b>SUBTRACT</b>	
Burgers - <b>BRING DOWN</b>	

STEP 1:  $1 \div 5 = x$

STEP 2: **DIVIDE:**  $12 \div 5 = 2$  and write 2 above 2

STEP 3: **MULTIPLY:**  $2 \times 5 = 10$  and write under 12

STEP 4: **SUBTRACT:**  $12 - 10 = 2$

STEP 5: **CHECK:** if you can divide your answer with 5. No, I cannot.

STEP 6: **BRING DOWN:** 5 to the next 2. It now forms 25

STEP 7: **DIVIDE:**  $25 \div 5 = 5$ . Write the answer above 5

STEP 8: **MULTIPLY:**  $5 \times 5 = 25$

STEP 9: **SUBTRACT:**  $25 - 25 = 0$

## 25. Inverse operation

The reversed of  $\times$  is  $\div$      $3 \times 4 = 12$      $12 \div 3 = 4$     or     $12 \div 4 = 3$

The reversed of  $\div$  is  $\times$      $48 \div 8 = 6$      $8 \times 6 = 48$     or     $6 \times 8 = 48$

The reversed of  $+$  is  $-$      $15 + 10 = 25$      $25 - 10 = 15$     or     $25 - 15 = 10$

The reversed of  $-$  is  $+$      $12 - 4 = 8$      $4 + 8 = 12$     or     $8 + 4 = 12$

## 26. Multiples:

A multiple is lots of the same number or quantity. Multiples are like multiplication tables e.g.

a) Counting in multiples of 2 from 0 to 12  
0; 2; 4; 6; 8; 10; 12.

b) Counting in multiples of 6:  
6; 12; 18; 24; 30; 36.

c) What is the 5th multiple of 8?  
 $5 \times 8 = 40$

## 27. Factors:

Factors are the whole numbers that can be divided into a certain number without a remainder.

a)  $12 = \{1; 2; 3; 4; 6; 12\}$   
*Factors pairs:  $1 \times 12, 2 \times 6, 3 \times 4$ .*

b)  $36 = \{1; 2; 3; 4; 6; 9; 12; 18; 36\}$   
*Factors pairs:  $1 \times 36, 2 \times 18, 3 \times 12, 4 \times 9, 6 \times 6$ .*

~ 22 ~

## 28. Prime factors:

A prime number has only two factors which are 1 and itself.

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97.

**REMEMBER ONE is not a prime number!**

Calculate the prime factors of 48

Always start with the smallest prime number, 2.

$$48 = 2 \times 2 \times 2 \times 2 \times 3$$

2	<u>48</u>	$48 \div 2,$
2	24	$24 \div 2$
2	12	$12 \div 2$
2	6	$6 \div 2$
3	3	$3 \div 2$ cannot, then $3 \div 3$
	1	

## 29. HCF & LCM

HCF – HIGHEST COMMON FACTOR

LCD – LOWEST COMMON MULTIPLE

NB: For the HCF and find the LCM of numbers, you should use the ladder method of prime factors.

LCM and HCF of 12 and 36:

2	<u>12</u>	2	<u>36</u>	$12 = \underline{2} \times 2 \times \underline{3}$
2	6	2	18	$36 = \underline{2} \times 2 \times \underline{3} \times 3$
3	3	3	9	
	1	3	3	
			1	

HCF: Get the pairs and multiply together:

$$\text{HCF} = 2 \times 3$$

$$= 6$$

LCM: Write down the pairs as well as remaining numbers and multiply:

$$\text{LCM} = 2 \times 3 \times 2 \times 3$$

$$= 36$$

### 30. Ratio and rate

#### **RATIO:**

Ratio is a way of comparing one quantity with another for instance: comparable number of acts, food or animals.

1. Jana takes 2 steps while Hannes takes 5. What is the ratio?

2: 5 (REMEMBER THE DOUBLE POINT!)

NB: We write the ratio in the order it appears in the sentence.

2. The ratio of cattle and sheep on a farm 4: 6

- a) If there are 320 animals, how many of it is cattle and how many is sheep?

$4 + 6 = 10$  (Add the total number of animals collected from the ratio).

$\frac{4}{10}$  of cattle and  $\frac{6}{10}$  of sheep.

Number of cattle:  $\frac{4}{10} \times 320 = 128$  cattle

Number of sheep:  $\frac{6}{10} \times 320 = 192$  sheep

TEST: Add the answers together to see if your work is correct:  $128 + 192 = 320$  animals.

#### **RATE:**

When different quantities or units are compared, it is called rate.

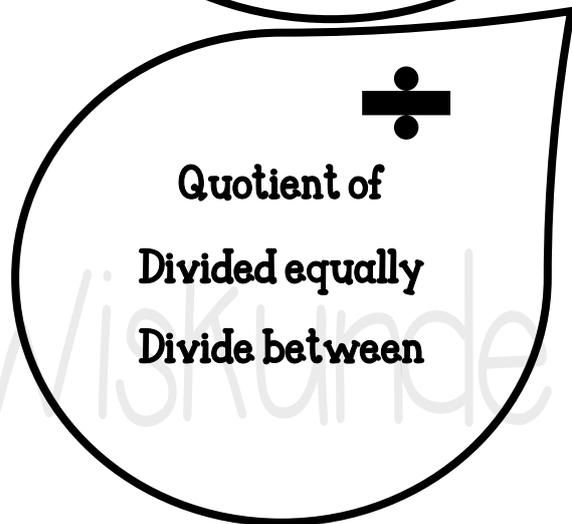
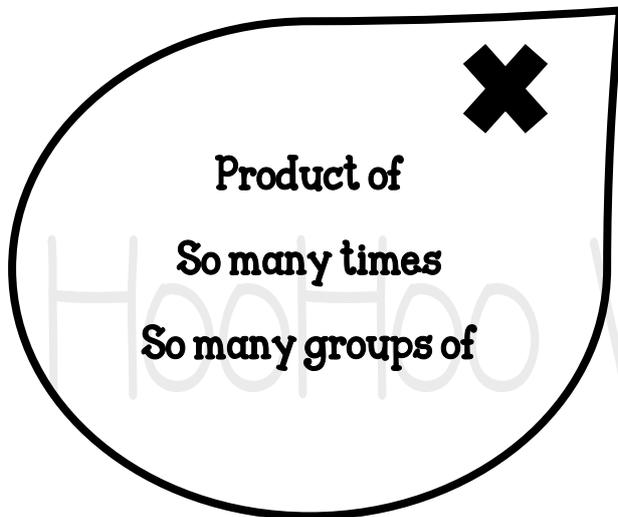
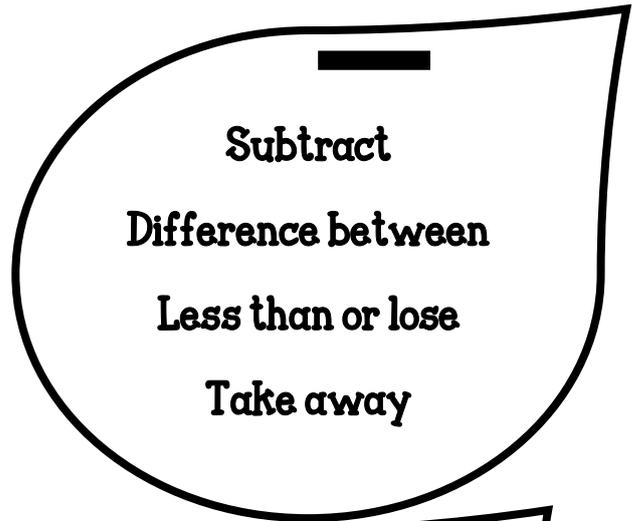
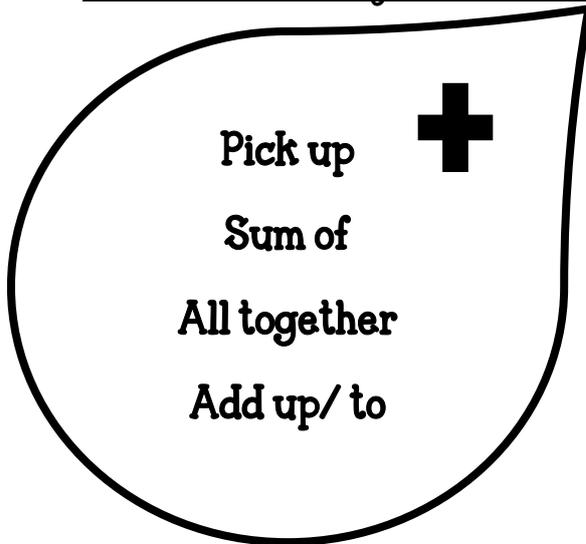
- a) If 3 bags of oranges cost R36, what is the cost of 1 bag?

$R36,00 \div 3 = R12,00$

- b) How much will 5 bags of oranges cost?

$R12,00 \times 5 = R70,00$

### 31. Problem solving vocabulary



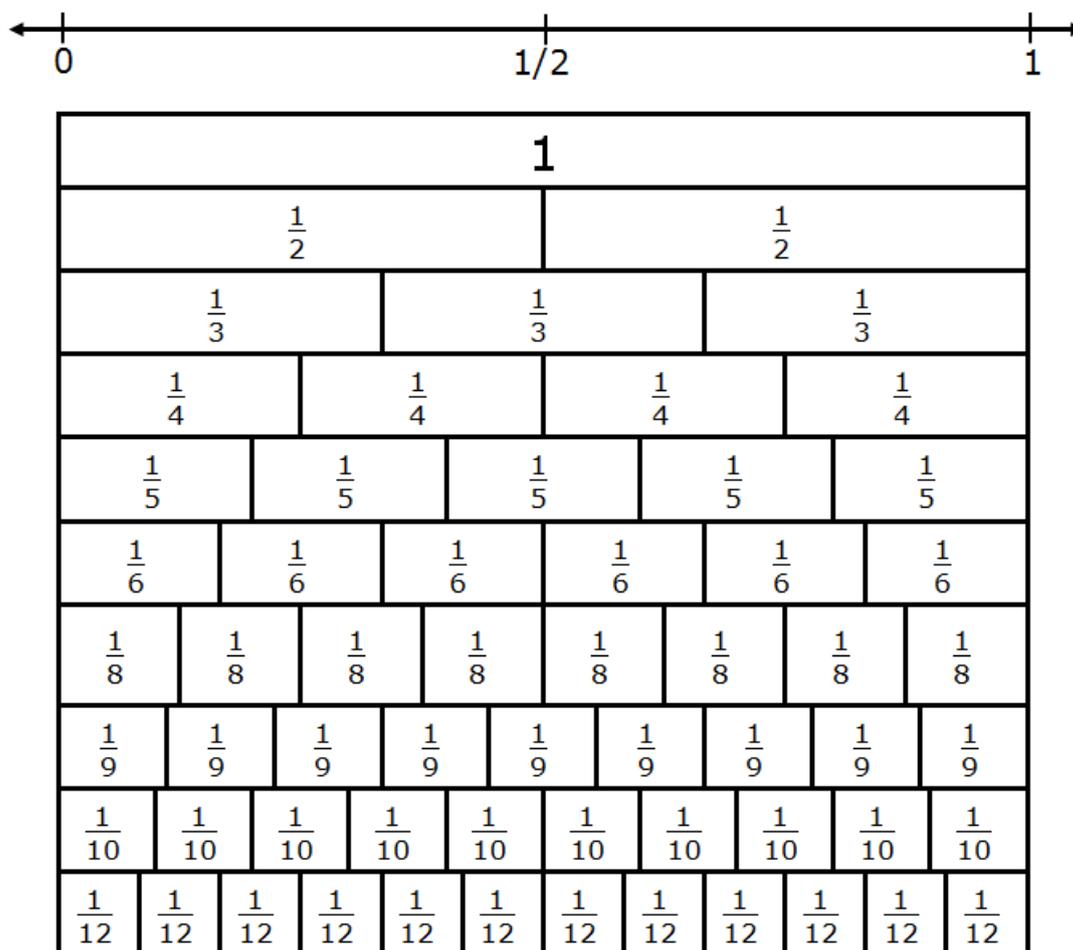
#### Problem solving rules

Susan buys 4 soft drinks for R8 each. What is the total of all the drinks?

1. Read the sum.
2. Search for information.      4 soft drinks and R8 each
3. Write a number sentence.    4 x R8 = \_\_\_\_\_
4. Do the calculation.            4 x 8 = 32
5. Write a sentence.              The total is R32 for 4 soft drinks.

## 1.2 COMMON FRACTIONS

### 1. Fraction wall



### 2. Numerator and denominator

$$\frac{1}{4} = \frac{\text{numerator}}{\text{denominator}}$$

Numerator: Count how many parts there are

Denominator: Name how many parts the whole is divided

### 3. Types of fractions

There are three types of fractions:

a) Proper fraction:  $\frac{1}{4}$  The numerator is smaller than the denominator

b) Improper fraction:  $\frac{5}{4}$  The numerator is greater than the denominator

c) Mixed numbers:  $1\frac{1}{4}$  An integer and a fraction

#### 4. Ordering fractions

Orders fractions from smallest to largest or from largest to smallest: The denominator of all fractions must be the same number.

$$\frac{4}{7}; \frac{2}{7}; \frac{6}{7}; \frac{1}{7}; \frac{7}{7}$$

Smallest to largest (ascending):  $\frac{1}{7}; \frac{2}{7}; \frac{4}{7}; \frac{6}{7}; \frac{7}{7}$

Largest to smallest (descending)  $\frac{7}{7}; \frac{6}{7}; \frac{4}{7}; \frac{2}{7}; \frac{1}{7}$

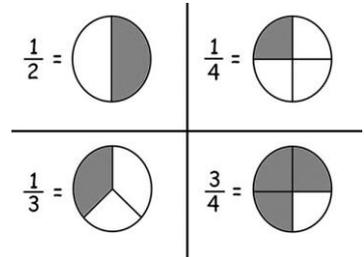
If the denominators are not the same, you have to change each fraction to the equivalent fraction:

$\frac{3}{6}; \frac{4}{12}; \frac{2}{3}$  All three of these fractions' denominator can change to 12:

a)  $\frac{3}{6} \times \frac{2}{2} = \frac{6}{12}$

b)  $\frac{4}{12}$

c)  $\frac{2}{3} \times \frac{4}{4} = \frac{8}{12}$



Smallest to largest (ascending):  $\frac{4}{12}; \frac{6}{12}; \frac{8}{12} = \frac{4}{12}; \frac{3}{6}; \frac{2}{3}$

Largest to smallest (descending)  $\frac{8}{12}; \frac{6}{12}; \frac{4}{12} = \frac{2}{3}; \frac{3}{6}; \frac{4}{12}$

#### 5. Equivalent fractions

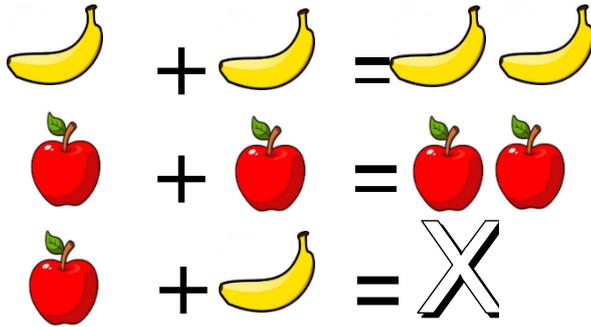
Equivalent fractions are worth the same. When you simplify a fraction, the new fraction is equivalent to the original fraction.

a)  $\frac{1}{2} = \frac{2}{4} = \frac{8}{16}$

b)  $\frac{1}{10} = \frac{2}{20} = \frac{3}{30}$

To get an equivalent fraction, you must multiply the original fraction's numerator and denominator with the same number.

## 6. Adding fractions



*I can add bananas and bananas, I can just add apples and apples, BUT I CANNOT add bananas and apples. So, I cannot add up fractions with different denominators.*

### A) ADD FRACTIONS WITH THE SAME DENOMINATOR

Fractions with the same denominators can be added together.

REMEMBER: We only count the numerator of the fractions, never the denominators!

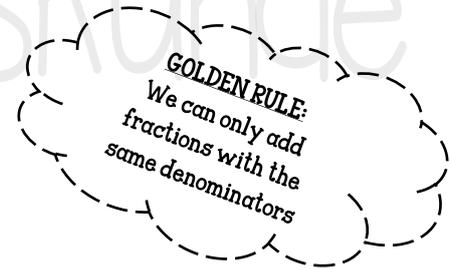
$$a) \frac{1}{5} + \frac{2}{5} = \frac{3}{5}$$

$$b) \frac{2}{8} + \frac{5}{8} = \frac{7}{8}$$

### B) ADD FRACTIONS WITH DIFFERENT DENOMINATOR

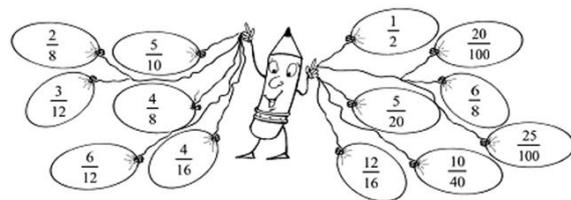
Find the fraction's equivalent fraction:

$$\begin{aligned} c) \frac{2}{3} + \frac{2}{6} &= - \\ &= \left(\frac{2}{3} \times \frac{2}{2}\right) + \frac{2}{6} \\ &= \frac{4}{6} + \frac{2}{6} \\ &= \frac{6}{6} \text{ or } 1 \end{aligned}$$



### C) ADDITION OF MIXED NUMBERS:

$$\begin{aligned} d) 1\frac{1}{4} + 3\frac{2}{4} &= - \\ &= 4 + \left(\frac{1}{4} + \frac{2}{4}\right) \\ &= 4\frac{3}{4} \end{aligned}$$



$$e) 1\frac{1}{4} + 3\frac{2}{4} = \text{---}$$

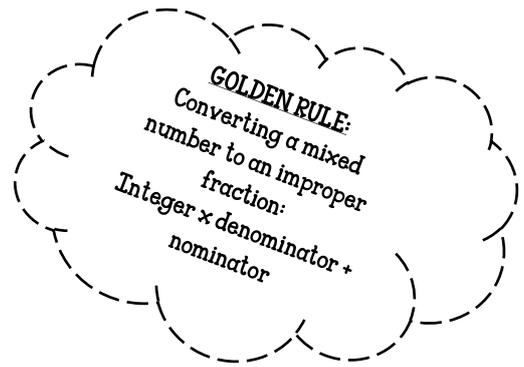
$$1\frac{1}{4} (1 \times 4 + 1 = 5) = \frac{5}{4}$$

$$3\frac{2}{4} (3 \times 4 + 2 = 14) = \frac{14}{4}$$

$$= \frac{5}{4} + \frac{14}{4}$$

$$= \frac{19}{4} \quad (19 \div 4 = 4 \text{ remaining } 3; 4 \text{ is the integer and remainder is the numerator})$$

$$= 4\frac{3}{4}$$



## 7. Subtracting fractions

### A) SUBTRACT FRACTIONS WITH THE SAME DENOMINATORS:

Subtracting fractions work the same as add fractions. You can only deduct fractions with the same denominator.

$$a) \frac{3}{5} - \frac{2}{5} = \frac{1}{5}$$

$$b) \frac{7}{10} - \frac{4}{10} = \frac{3}{10}$$

HooHoo Wiskunde

### B) SUBTRACT FRACTIONS WITH DIFFERENT DENOMINATORS:

Find the fraction's equivalent fraction:

$$c) \frac{8}{9} - \frac{1}{3} = \text{---}$$

$$= \frac{8}{9} - \left(\frac{1}{3} \times \frac{3}{3}\right)$$

$$= \frac{8}{9} - \frac{3}{9}$$

$$= \frac{5}{9}$$

### C) SUBTRACTION OF MIXED NUMBERS:

$$d) 4\frac{3}{4} - 3\frac{2}{4} = \text{---}$$

$$= 1\left(\frac{3}{4} - \frac{2}{4}\right)$$

$$= 1\frac{1}{4}$$

e) BORROWING METHOD:

$$7\frac{2}{5} - 3\frac{4}{5} = - \quad (\text{2nd mixed number's nominator is more than the first mixed number's nominator})$$

$7-1 = 6$ , now use the 1 and convert to a fraction

$$1 = \frac{5}{5}$$

$$= 6\left(\frac{5}{5} + \frac{2}{5}\right) - 3\frac{4}{5}$$

$$= 6\frac{7}{5} - 3\frac{4}{5} = -$$

$$= 3 + \left(\frac{7}{5} - \frac{4}{5}\right)$$

$$= 3\frac{3}{5}$$

f) CONVERSION TO IMPROPER FRACTION METHOD

$$7\frac{2}{5} - 3\frac{4}{5} = -$$

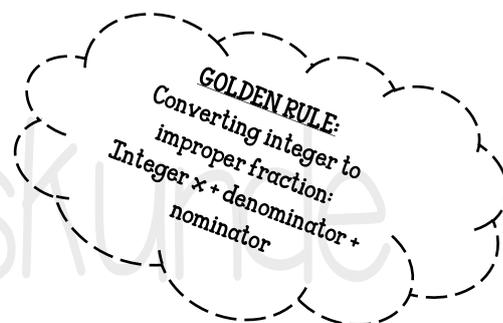
$$7\frac{2}{5} \quad (7 \times 5 + 2 = 37) = \frac{37}{5}$$

$$3\frac{4}{5} \quad (3 \times 5 + 4 = 19) = \frac{19}{5}$$

$$= \frac{37}{5} - \frac{19}{5}$$

$$= \frac{18}{5} \quad (18 \div 5 = 3 \text{ remainder } 3; 3 \text{ is the integer and the remainder are the nominator})$$

$$= 3\frac{3}{5}$$



8. Calculate a fraction of an integer

Rule: Integer  $\div$  denominator  $\times$  nominator

a)  $16\frac{1}{4}$        $16 \div 4 \times 1 = \underline{4}$

b)  $45\frac{5}{15}$        $45 \div 15 \times 5 = \underline{15}$

c)  $\frac{4}{6}$  of 5250       $5250 \div 6 \times 4 = \underline{3500}$

## 1.3 DECIMAL FRACTIONS

### I. Decimal numbers

Decimal numbers are used to represent numbers that are smaller than 1 unit. Decimals are written to the right of the units' place separated by a comma.

A decimal fraction is a sort of fraction that uses tenths, hundredths, thousandths, and so on. Decimal fractions have digits to the right of the decimal comma. The denominator must be 10, 100, 1000 so that the decimal fraction can be written as a decimal number. When the fraction has a denominator of 10, 100 or 1000, look at the nominator.

#### FIRST CHANGE THE FRACTION TO A DENOMINATOR OF 10, 100 OR 1 000 WITH AN EQUIVALENT FRACTION.

A) 10: Ten has 1 zero, so the nominator must be placed after the comma.

For example: 
$$\frac{1}{2} \times \frac{5}{5} = \frac{5}{10} = 0,5$$

B) 100: Hundreds have two zeros. Look at the nominator. Each number of the nominator must take a place after the comma.

For example: 
$$\frac{1}{4} \times \frac{25}{25} = \frac{25}{100} = 0,25$$

If the nominator is greater than the denominator and there are not enough zeros for the numbers to place, we write the rest of the numbers before the comma as integers:

For example: 
$$\frac{5}{4} \times \frac{25}{25} = \frac{125}{100} = 1,25$$

If the nominator is less than the number of zeros in the dominator, we have to write a 0 before the number that serves as a placeholder.

For example: 
$$\frac{4}{100} = 0,04$$

C) 1000: Thousand have three zero. Therefore, we look at the nominator. Each number of the nominator must take a place of 0, after the comma.

For example: 
$$\frac{5}{8} \times \frac{125}{125} = \frac{625}{1000} = 0.625$$

**865,391**  
Integers      fraction

## 2. Fractions as a percentage

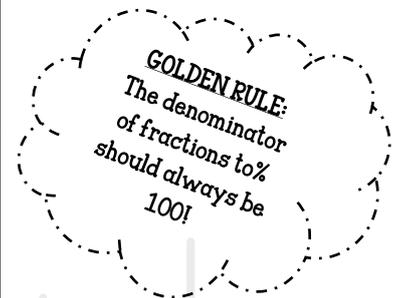
### A) Fraction to%

Change the fraction to an equivalent fraction with a denominator of 100. When the fraction has a denominator of 100, use the nominator as the percentage e.g.

- a)  $\frac{80}{100} = 80\%$   
 b)  $\frac{74}{100} = 74\%$   
 c)  $\frac{12}{100} = 12\%$

When the denominator is not 100, you should change it. Here is a table that can help you with the processing:

Denominator	Multiply	New denominator
2	x 50	100
4	x 25	100
5	x 20	100
8	x 125 ÷ 10	100
10	x 10	100
20	x 5	100
25	x 4	100
50	x 2	100



a)  $\frac{1}{2} \times \frac{50}{50} = \frac{50}{100} = \frac{50}{100} = 50\%$   
 b)  $\frac{3}{4} \times \frac{25}{25} = \frac{75}{100} = \frac{75}{100} = 75\%$

### B) % to a fraction:

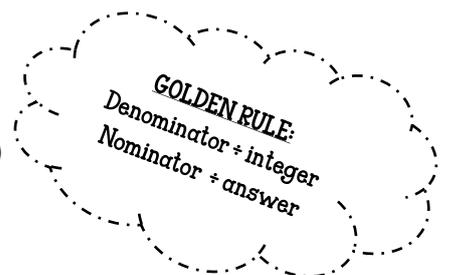
A percentage is a fraction with a denominator of 100:

a)  $20\% = \frac{20}{100} \div \frac{20}{20} = \frac{1}{5}$   
 b)  $50\% = \frac{50}{100} \div \frac{50}{50} = \frac{1}{2}$   
 c)  $75\% = \frac{75}{100} \div \frac{25}{25} = \frac{3}{4}$

### C) Calculated a percentage of a whole number:

$\% \div 100 \times \text{integer}$

a) 25% of 20:  
 $= \frac{25}{100} \times 20$  ( $100 \div 20 = 5$      $25 \div 5 = 5$ )  
 $= 5$



### 3. Write an improper fraction as a mixed number

We do the following calculation to write an improper fraction to a mixed number:

$$\begin{aligned} \text{a) } \frac{7}{4} & \quad 7 \div 4 = 1 \text{ rest } 3 \\ & = 1 \frac{3}{4} \end{aligned}$$

The answer is written as the whole number, the remainder as the numerator and the original denominator remains the denominator.

$$\begin{aligned} \text{b) } \frac{81}{35} & \quad 72 \div 35 = 2 \text{ remainder } 11 \\ & = 2 \frac{11}{35} \end{aligned}$$

The answer is written as the whole number, the remainder as the numerator and the original denominator remains the denominator.

### 4. Write a mixed number as an improper fraction

To convert a mixed number as an improper fraction, we must do the following calculations:

$$\begin{aligned} \text{a) } 1 \frac{2}{5} & \\ & \underline{\text{Integer} \times \text{denominator} + \text{nominator}} \\ 1 \times 5 + 2 & = 7 \\ & = \frac{7}{5} \end{aligned}$$

The answer is the nominator and the original denominator, remains the denominator.

**GOLDEN RULE:**  
Integer  $\times$  denominator +  
nominator.

### 5. Multiply decimal numbers with 10 or 100

When multiply by 10 or 100, the comma moves to the right. The comma moves the amount of spaces of zeros.

10: comma move up one place to the right

100: comma move two places to the right

- a)  $0,5 \times 10 = 5$
- b)  $0,14 \times 10 = 1,4$
- c)  $0,08 \times 100 = 8$
- d)  $1,76 \times 10 = 17,6$

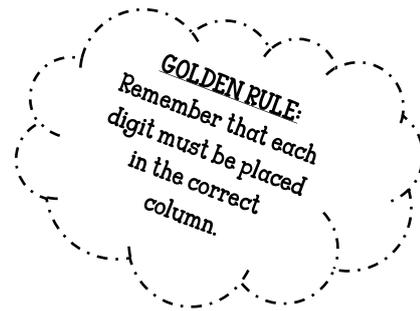
**GOLDEN RULE:**  
The comma always  
moves to the right  
with multiplication.

6. Addition and subtraction of decimals to at least two decimal places

Column method

a)  $35,16 + 14,28 = 49,44$

	T	O	,	t	h
	3	5	,	1	6
+	1	4	,	2	8
	4	9	,	4	4



b)  $147,8 + 112,57 = 260,37$

	H	T	O	,	t	h
	1	4	7	,	8	0
+	1	1	2	,	5	7
	2	6	0		3	7

c)  $41,87 - 27,64 = 14,23$

	T	O	,	t	h
	4	1	,	8	7
-	2	7	,	6	4
	1	4	,	2	3

d)  $178 - 92,63 = 85,37$

	H	T	O	,	t	h
	1	7	8	,	0	0
+		9	2	,	6	3
		8	5	,	3	7

7. VAT

South Africa's value-added tax is calculated as 15%.

To calculate tax:

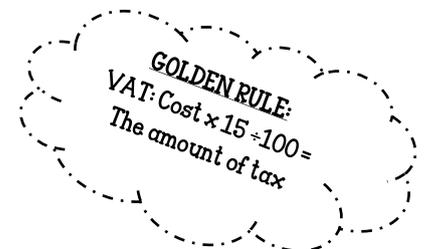
The price of a bicycle before VAT is R570,00.

What will the price be after VAT?

$R570 \times 15 \div 100 = R85,50$

$R570 + R85,50 = R655,50$

The total price of the bicycle is R655,50 after VAT.



## 8. Profit

Profit is what you make when you sell something for more than you paid for it. The profit is the difference between buying and selling prices.

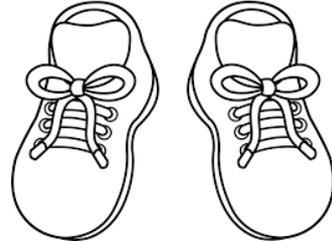
The shoemaker wants to sell his shoes for a profit of 25%.

The shoes cost R75. He wants to make a profit of 25%. For what price should he sell the shoes?

$$R75 \times 25 \div 100 = R18,75$$

$$R75,00 + R18,75 = R93,75$$

- Percentage of profit: 25%
- Profit: R18,75
- Selling price: R93,75



## 9. Loss

A shopkeeper makes a loss when the selling price is less than the buying price.

The shoemaker wants to sell his shoes at a loss of 15%.

The shoes cost R75. He suffered a loss of 15%. For what price should he sell the shoes?

$$R75 \times 15 \div 100 = R11,25$$

$$R75,00 - R11,25 = R63,75$$

- Percentage of loss: 15%
- Loss: R11,25
- Selling price: R63,75

## 10. Discounts

A discount is a reduction in the cost of something. You often get a discount for paying early or paying in large quantities.

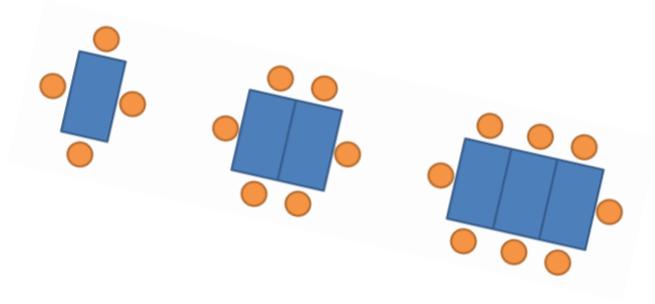
The shoemaker wants to sell his shoes at a 10% discount.

A pair of shoes cost R75. He has a special offer of 10% discount. For what price should he sell the shoes?

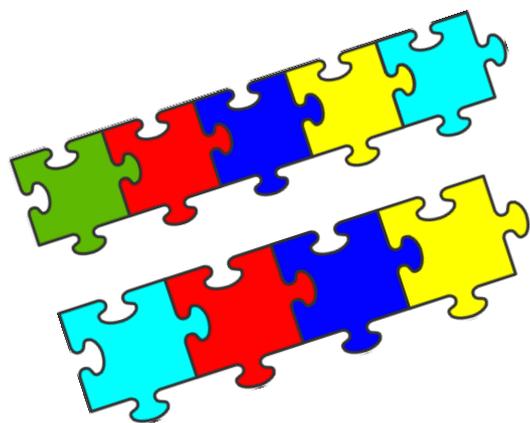
$$R75 \times 10 \div 100 = R7,50$$

$$R75 - R7,50 = R67,50$$

- Percentage discount: 10%
- Discounts: R7,50
- Selling price: R67,50



# Patterns, features & algebra



## 2.1 NUMERICAL PATTERNS

### 1. Numerical patterns

Patterns consisting of numbers or numbers.

a) Intervals:

15; 25; 35; 45; 55. (We add 10 to number: interval = 10)

b) Consecutive:

14; 15; 16; 17; 18. (Numbers following each other.)

c) Prior numbers:

15; 16; 17; 18; 19. (Numbers just coming before a number.)

### 2. Table Patterns

Determine the following pattern: I use the input number + 3

2	4	6	8	10	12	14	16
5	7	9	11	13	15	17	19

### 3. Flow charts

a) Input - rule - output

3	x2		6
7			14
9			18
10			20

b) Input - rule

1	+2	x4		?	$1 + 2 \times 4 = 12$	
2				?	$2 + 2 \times 4 = 16$	
3					?	$3 + 2 \times 4 = 20$
4					?	$4 + 2 \times 4 = 24$

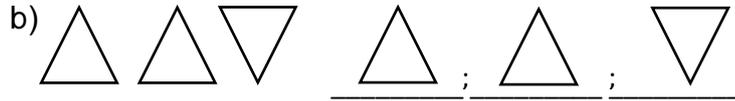
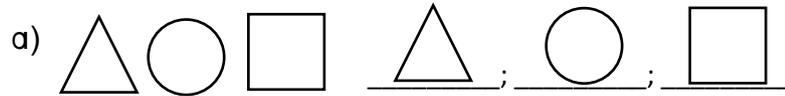
c)  - rule - output

?	+3	x2		8	$8 \div 2 - 3 = 1$	
?				12	$12 \div 2 - 3 = 3$	
?					16	$16 \div 2 - 3 = 5$
?						

## 2.2 GEOMETRIC PATTERNS

### 4. Geometric patterns

Geometric patterns are formed by shapes or patterns that follow a rule



### 5. Multiply Patterns

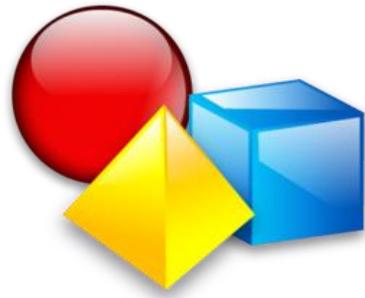
Determine the following pattern: I used the input number  $\times 4$

1	2	4	6	8	10	12
4	8	16	24	32	40	48

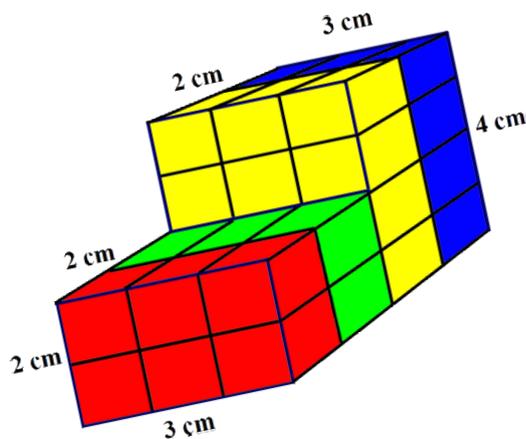
### 6. Flow charts

Input - ? - output

1	?	5	$5 \div 1 = 5$
2		10	$10 \div 2 = 5$
3		15	$15 \div 3 = 5$
4		20	$20 \div 4 = 5$
5		25	$25 \div 5 = 5$



# Space & Shapes

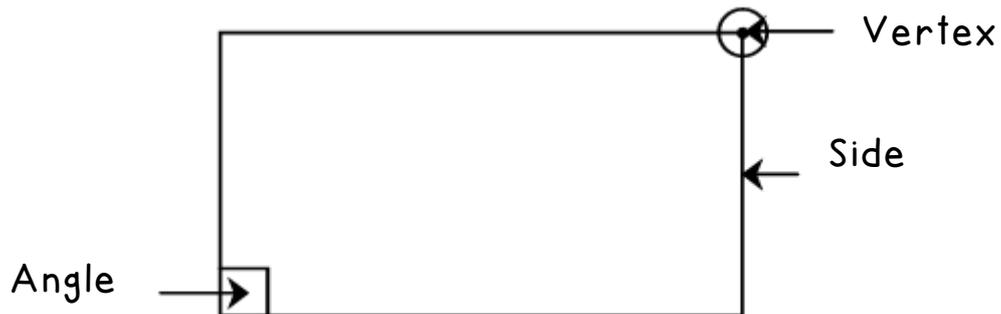


## 3.1 2-D SHAPES

### 2-D shapes:

Two-dimensional shapes are flat shapes and they have length and width but no thickness.

The 2-D shape has three characteristics: A vertex, a side and an angle

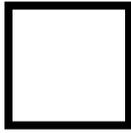


**Vertex:** where two sides of a polygon meets.

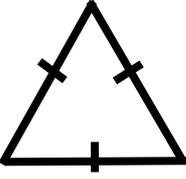
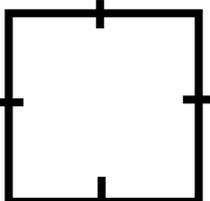
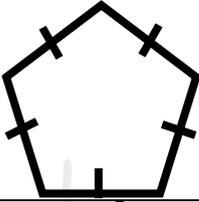
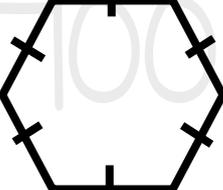
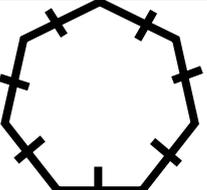
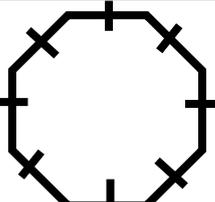
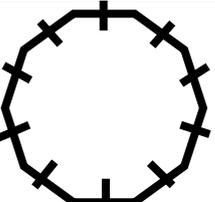
**Side:** the line segments are the sides of a polygon. It can be straight or curved.

**Angle:** The angle in a rectangle and a square is  $90^\circ$ . It is the angle inside a certain shape.

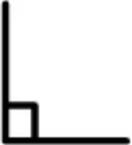
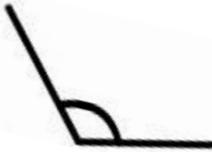
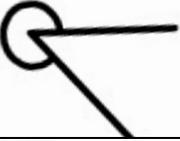
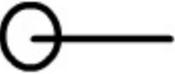
## I. Properties of 2-D shapes

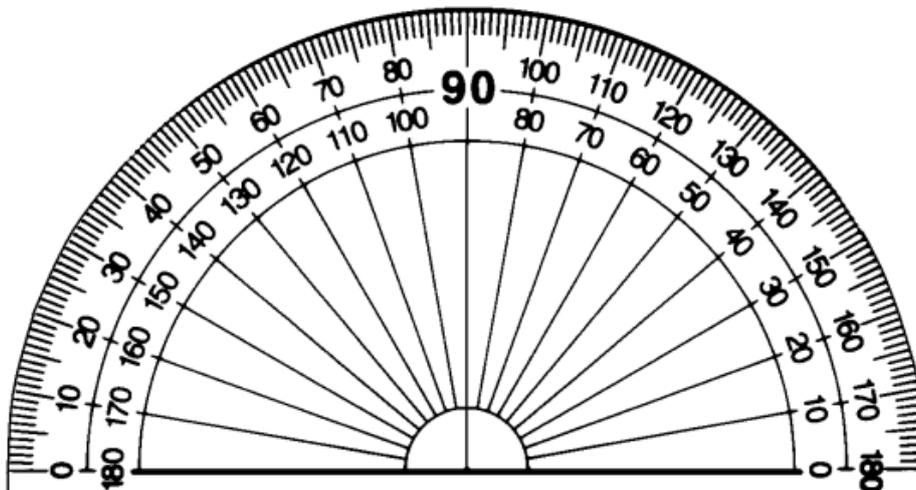
Shape	Sketch	Characteristics
Square		<ul style="list-style-type: none"> <li>All four sides are equal</li> <li>All four corners are equal</li> <li>All angles are <math>90^\circ</math></li> <li>Opposite sides are parallel</li> </ul>
Rectangle		<ul style="list-style-type: none"> <li>Two pairs of opposite sides are equal</li> <li>All four corners are equal</li> <li>All angles are <math>90^\circ</math></li> </ul>
Circle		<ul style="list-style-type: none"> <li>Curved line</li> <li>No straight sides</li> <li>No corners</li> </ul>
Triangle		<ul style="list-style-type: none"> <li>Three sides</li> </ul>
Equilateral triangle		<ul style="list-style-type: none"> <li>Three sides are equal</li> <li>All three angles are <math>60^\circ</math></li> <li>All three angles are equal</li> </ul>
Isosceles triangle		<ul style="list-style-type: none"> <li>Two sides (legs) are the same length</li> <li>Two angles are equal</li> </ul>
Scalene triangle		<ul style="list-style-type: none"> <li>No sides are equal</li> <li><math>90^\circ</math> right angle</li> </ul>
Kite		<ul style="list-style-type: none"> <li>Two equal adjacent sides</li> </ul>
Trapezium		<ul style="list-style-type: none"> <li>A pair of parallel opposite sides</li> </ul>
Parallelogram		<ul style="list-style-type: none"> <li>Two pairs of equal opposite sides</li> <li>Two pairs of parallel opposite sides</li> </ul>
Rhombus		<ul style="list-style-type: none"> <li>Four sides of equal sides</li> <li>Two opposite sides are parallel</li> <li>Two pairs of opposite angles are equal</li> </ul>

## POLYGONS

Sketch	Name	Meaning	Number of sides and angles
	Triangle	Three = 3	3 angles and 3 sides
	Square / rectangle	Four = 4	4 corners and 4 sides
	Pentagon	Penta = 5	5 corners and sides 5
	Hexagon	Hexa = 6	6 angles and 6 sides
	Heptagons	Hepta = 7	7 corners and sides 7
	Octagon	Octa = 8	8 corners and 8 sides
	Decagon	Deca = 10	10 corners and 10 sides

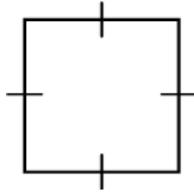
## 2. Types of angles

Name of angle	Sketch	Explanation
Acute angle		An acute angle measures between $0^\circ$ and $90^\circ$ .
Right angle		The angle is $90^\circ$ .
Obtuse angle		Obtuse angle measures between $90^\circ$ and $180^\circ$ .
Straight angle		A straight angle is half a turn and measures $180^\circ$ .
Reflex angle		A reflex angle measures between $180^\circ$ and $360^\circ$ .
Revolution		A total revolution of $360^\circ$ around a certain point. The angle is $360^\circ$ .

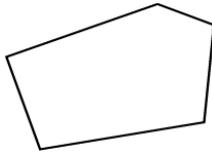


### 3. Regular and irregular polygons

- A regular polygon sides are all the **same length** and the corners are all **equal**. The more sides a regular polygon has, the greater the shape's angles.

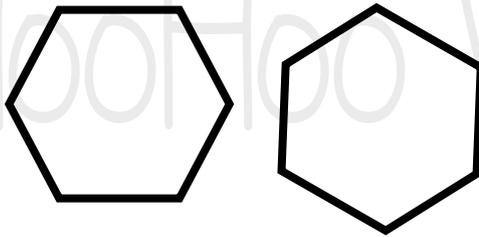


- An irregular polygon's sides are all different lengths and angles are different sizes.



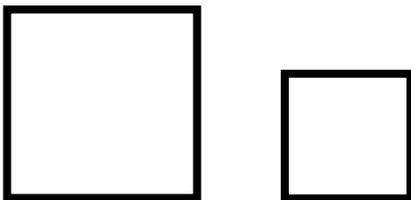
### 4. Congruent shapes

Congruent shapes are shapes that look exactly the same and is the same size.

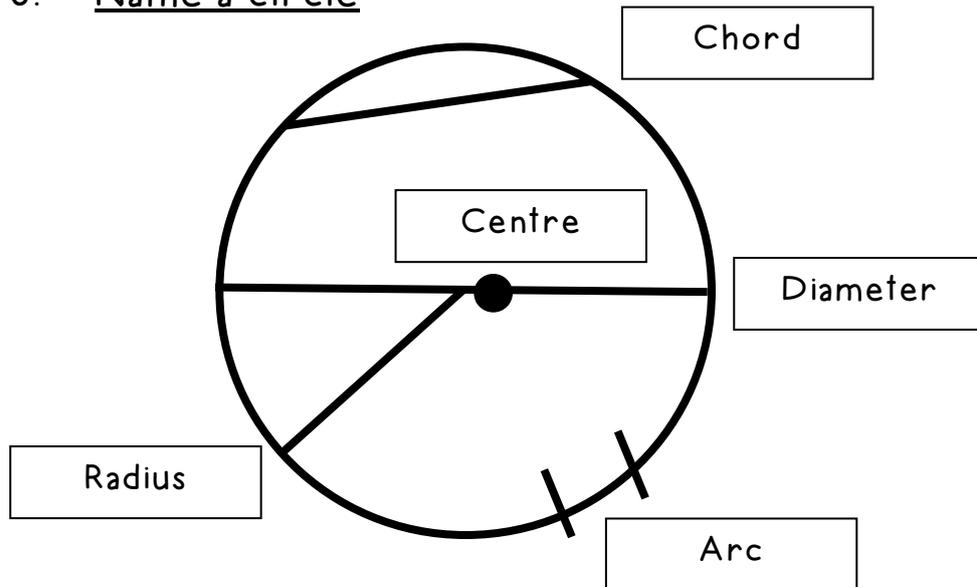


### 5. Similar shapes

Similar forms are forms that are similar but not the same size.



6. Name a circle



7. Types of lines

Type of lines	Characteristic	Sketch
Line segment / segment	Part of a line with two endpoints	
Line	A set of points that forms a straight path and extends indefinitely in opposite directions	
Half line (ray)	Part of a line that starts at an endpoint and extends indefinitely in one direction.	
Horizontal line	It is a line that runs horizontally from left to right or right to left.	
Vertical line	It is a line that stretches vertically from top to bottom or from bottom to top.	
Parallel lines	These are lines continue down the same distance apart.	
Perpendicular lines	Two straight lines that meet at a 90° point.	

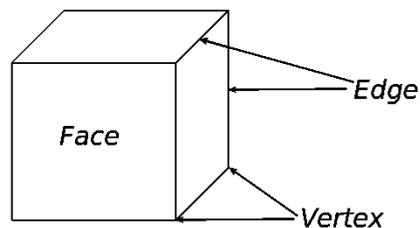
## 3.2 3-D SHAPES

### 3-D shapes:

Three dimensional shapes are solid shapes. The shapes have length, width and height.

3-D shapes have three characteristics:

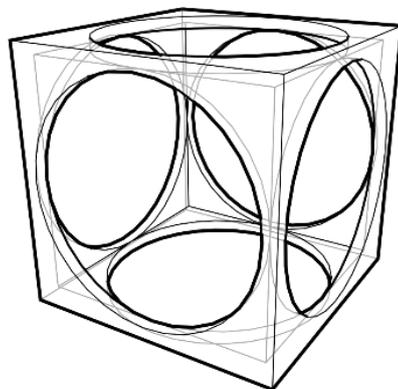
- A face,
- An edge
- A vertex



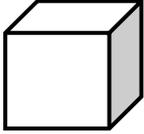
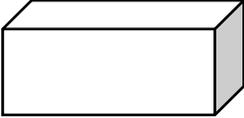
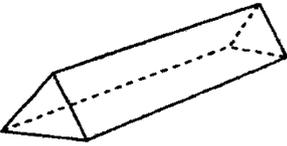
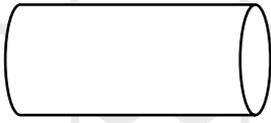
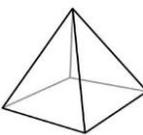
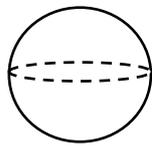
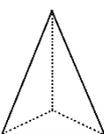
**FACE:** A face is the side of a solid shape. It usually means a flat face. The base of a shape is also a face.

**EDGE:** The edge of a shape is where two faces meet. An edge can be straight or curved.

**VERTEX:** A vertex is a point at which two or more lines meet in an object or a shape.

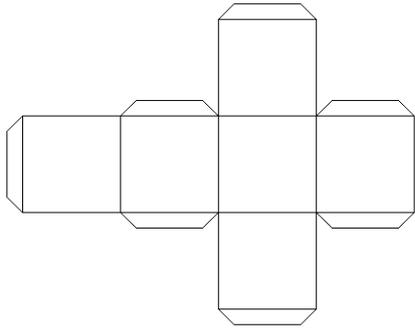


# 1. Properties of 3-D shapes

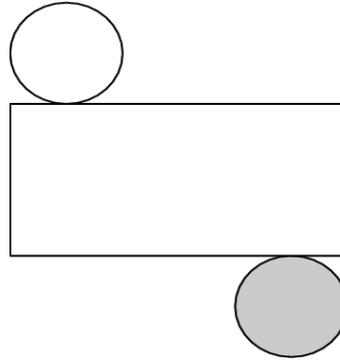
3-D shape	Name	Number of faces	Number of flat faces	Number of curved faces	Number of edges	Number of vertexes
	Cube	6	6	0	12	8
	Rectangular prism	6	6	0	12	8
	Triangular prism	5	5	0	9	6
	Cylinder	3	2	1	2	0
	Cone	2	1	1	1	1
	Pyramid	5	5	0	8	5
	Sphere	1	0	1	0	0
	Tetrahedron	4	4	0	6	4

## 2. 3-D shapes' nets

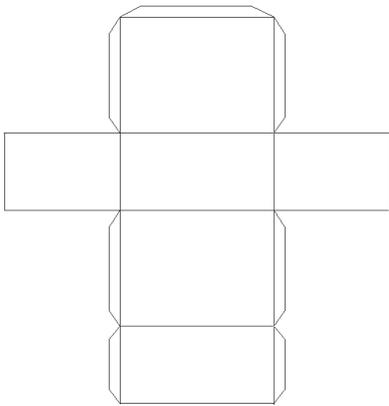
1. Cube



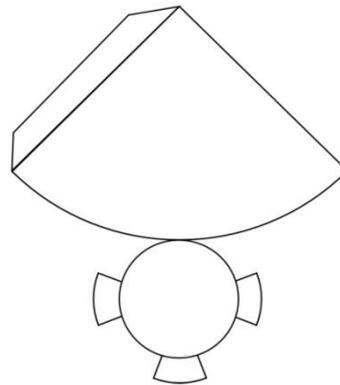
4. Cylinder



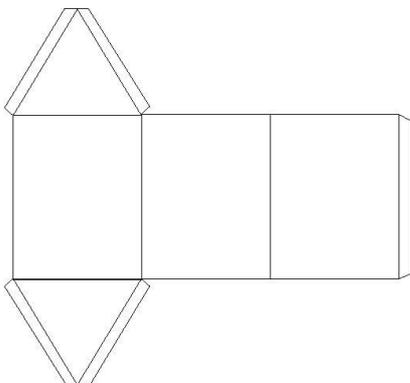
2. Rectangular prism



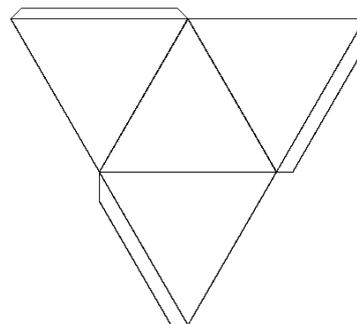
5. Cone



3. Triangular prism



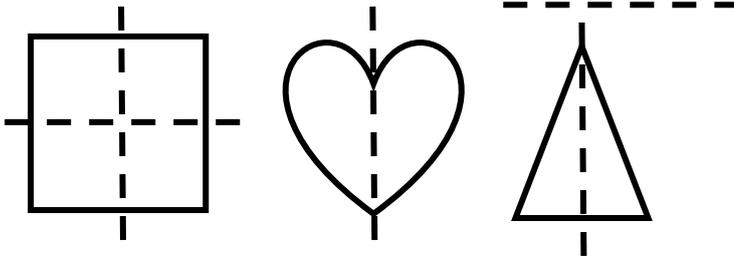
6. Pyramid



## 3.3 SYMMETRY

### 1. Line symmetry

A line of symmetry divides a shape in half. One half is the reflection of the other half. The line of symmetry is the same as a mirror line. Some shapes have no lines of symmetry, others have one or even more than one. Symmetry lines are always represented by dotted lines.



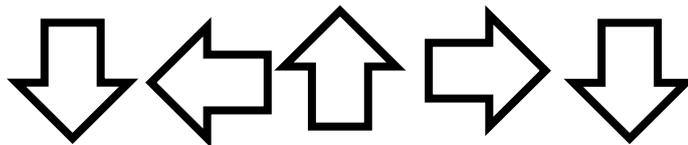
#### Symmetry:

This is how many lines of symmetry a particular shape has, which is proportional.

- a) A square has four lines of symmetry
- b) A rectangle has two lines of symmetry
- c) An equilateral triangle has 3 lines of symmetry
- d) An isosceles triangle has one line of symmetry
- e) A circle has infinitely many lines of symmetry

### 2. Rotational symmetry

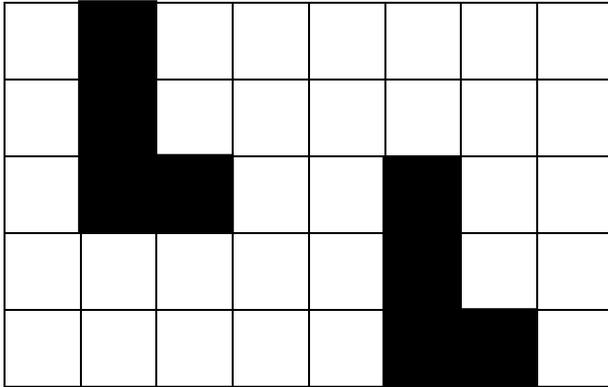
Rotational symmetry is when it will fit in more than one way. If a shape is being rotated and it looks exactly the same before the turn is complete, it has a rotational symmetry.



## 3.4 TRANSFORMATIONS

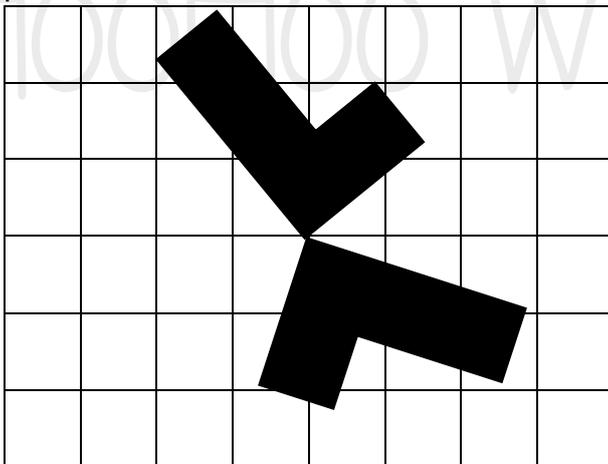
### 1. Translation

If you translate a shape you slide it into a different position. It can move in a vertical, horizontal or diagonal line, but no rotation or change is applied in size.



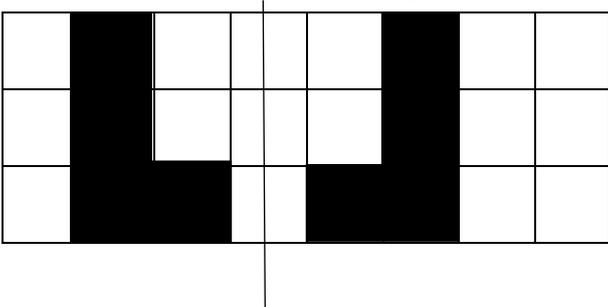
### 2. Rotation

Rotation is a rotational movement of an object or shape around a point.



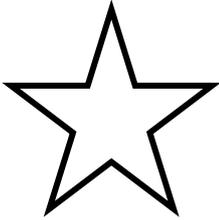
### 3. Reflection

Reflection is a transformation where one image is a mirror image of the other shape or object.



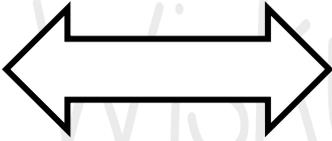
#### 4. Reduction

Reduction means to reduce a shape's size in a certain ratio to change the shape or direction thereof.

Original	Reduction
	

#### 5. Enlargement

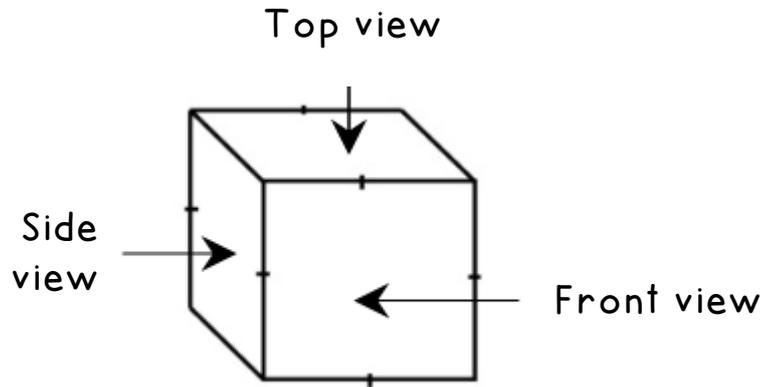
Enlargement means to enlarge a shape or object to a certain ratio.

Original	Enlargement
	

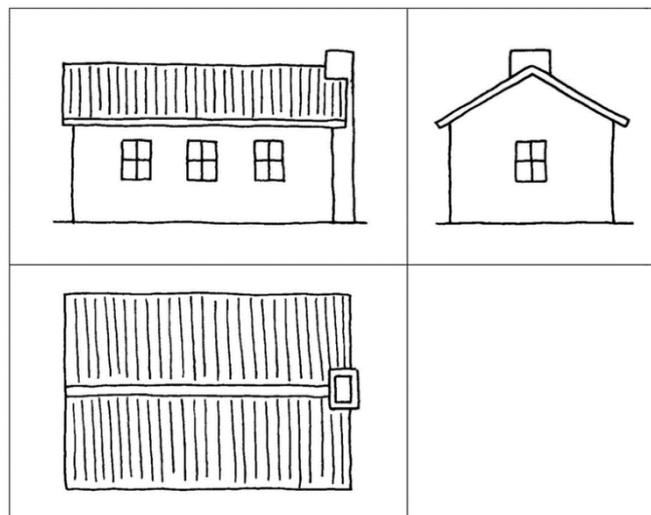
## 3.5 VIEWS OF OBJECTS

When we look at views of objects, there are three views, namely:

- Top view
- Side View
- Front view



It is drawn like how we see the object.



## 3.6 POSITION AND REPLACEMENT

Determine the location of an object on a grid of a map. A grid consists of rows and columns.

Rows - from left to right

Columns - from top to bottom

	A	B	C	D	E	F	G
1							
2							
3							
4							
5							
6							

Column

Where are the keys on the map?

- Heart (B; 2) and (G; 5)
- Plus: (A; 4)
- Smiley (B; 5)
- Lightning: (E; 1)
- Arrow (D; 4)

We always write the columns' values first and the row's value second.

Row

Coordinates:

	A	B	C	D	E	F	G
1							
2							
3							
4							
5							
6							

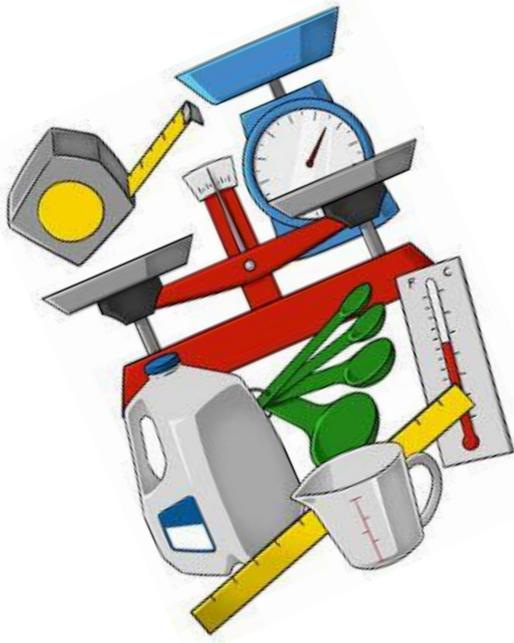
STARTING POINT: B5

The ant walks 3 places up, 2 places to the right, one place up and one place to the left.  
Where is the ant now?

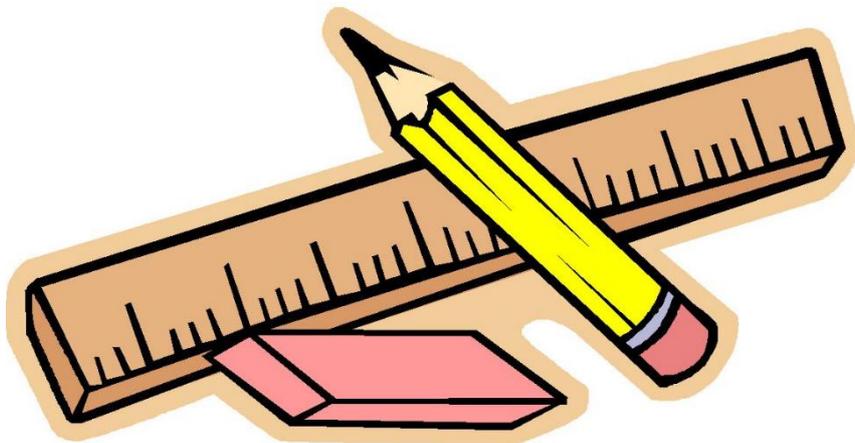
Up - minus  
Down - plus  
Left - minus  
Right - plus

B5 - 3 places up = B2  
B2 + 2 places right = D2  
D2 - 1 place up = D1  
D1 - 1 place to right = C1

END POINT: C1



# MEASUREMENT



## 4.1 LENGTH

Length: This determines how long an object is or how far two distances apart from each other.

NAME	ABBREVIATION	MEASURING
millimetre	mm	To measure very short items
centimetres	cm	To measure short objects
meter	m	To measure shorter items
kilometre	km	To measure long distances

$1 \text{ cm} = 10 \text{ mm}$   
 $10 \text{ cm} = 100 \text{ mm}$   
 $1 \text{ m} = 100 \text{ cm} = 1\,000 \text{ mm}$   
 $1 \text{ m} = 1000 \text{ mm}$   
 $1 \text{ km} = 1000 \text{ m}$



Fraction units:

$\frac{1}{2} = 500$	$\frac{1}{2} \text{ km} = 500 \text{ m}$
$\frac{1}{4} = 250$	$\frac{1}{4} \text{ km} = 250 \text{ m}$
$\frac{3}{4} = 750$	$\frac{3}{4} \text{ km} = 750 \text{ m}$
$\frac{1}{8} = 125$	$\frac{1}{8} \text{ km} = 125 \text{ m}$

CONVERSION OF UNITS:

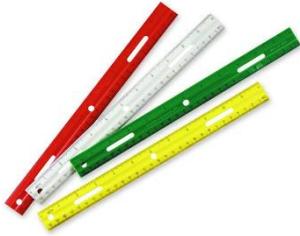
	King	Henry	Died	By	Drinking	Chocolate	Milk
	Kilo	Hecto	Deca	Unit	Desi	Centi	Milli
m	km	hm	dm	m	dm	cm	mm

Each block represents 10 units. From one block to another unit, you just count the number of blocks and multiply or divide the amount with 10 e.g.:

- From km to m: 3 blocks so it  $(\times 10 \times 10 \times 10)$  equals to 1 000.
- m to cm: 2 blocks so it  $(\times 10 \times 10)$  equals to 100.
- From cm to mm 1 block so it  $(\times 10)$  equals to 10.
- From km to mm 6 blocks so it  $(\times 10 \times 10 \times 10 \times 10 \times 10 \times 10)$  equals to 1 000 000.
- From km to cm 5 blocks so it  $(\times 10 \times 10 \times 10 \times 10 \times 10)$  equals to 100 000
- m to mm is 3 blocks so it  $(\times 10 \times 10 \times 10)$  equals to 1 000.

Instruments which we use to measure:

- **Ruler:** To measure short distances shorter than 15cm or 30cm.



- **Metre stick:** To measure any distance up to one metre.



- **Tape measure:** To measure longer distances with a tape measure.



- **Click wheel:** To measure a certain distance with a click wheel. The wheel clicks for every metre.



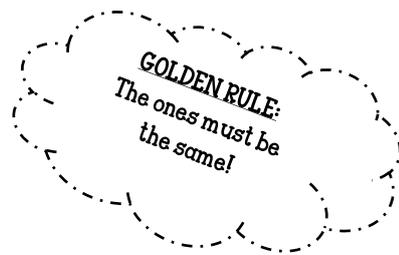
- **Odometer:** The instrument used in cars to determine distance in kilometres.



Addition and subtraction of lengths:

a)  $13,52 \text{ m} + 16,14 \text{ m} = 29,66 \text{ m}$

	T	O	,	t	h
	1	3	,	5	2
+	1	6	,	1	4
	2	9	,	6	6



b)  $175,52 \text{ km} + 122,58 \text{ km} = 298,1 \text{ km}$

	H	T	O	,	t	h
	1	7	5	,	5	2
+	1	2	2	,	5	8
	2	9	8	,	1	0

c)  $45,86 \text{ cm} - 24,46 \text{ cm} = 21,4 \text{ cm}$

	T	O	,	t	h
	4	5	,	8	6
-	2	4	,	4	6
	2	1	,	4	0

d)  $854,41 \text{ mm} - 357,95 \text{ mm} = 496,46 \text{ mm}$

	H	T	O	,	t	h
	<del>8</del>	<del>5</del>	<del>4</del>	,	<del>4</del>	1
-	3	5	7	,	9	5
	4	9	6	,	4	6

Multiplication and division of lengths:

a)  $26,4 \text{ m} \times 6 \text{ m} = 158,88$

	H	T	O	,	t	h
		<sup>3</sup> 2	<sup>2</sup> 6	,	<sup>4</sup> 4	8
+						6
	1	5	8	,	8	8

b)  $165,25 \text{ mm} \div 5 = 33,05 \text{ mm}$

		3	3	,	0	5
5	1	6	5	,	2	5

## 4.2 MASS

**MASS:** It is determined how much they weigh an object.

NAME	ABBREVIATION	MEASURING
milligram	mg	To weigh very light objects
gram	g	To measure light objects
kilogram	kg	To weigh lighter objects
ton	t	To weigh very heavy objects

$$1 \text{ kg} = 1000 \text{ g}$$

$$1 \text{ g} = 1000 \text{ mg}$$

Fraction units:

$$\frac{1}{2} = 500$$

$$\frac{1}{4} = 250$$

$$\frac{3}{4} = 750$$

$$\frac{1}{8} = 125$$

$$\frac{1}{2} \text{ kg} = 500 \text{ g}$$

$$\frac{1}{4} \text{ kg} = 250 \text{ g}$$

$$\frac{3}{4} \text{ kg} = 750 \text{ g}$$

$$\frac{1}{8} \text{ kg} = 125 \text{ g}$$



**CONVERSION OF UNITS:**

	King	Henry	Died	By	Drinking	Chocolate	Milk
	Kilo	Hecto	Deca	Unit	Desi	Centi	Milli
<b>g</b>	<b>kg</b>	hm	dm	<b>g</b>	dm	cg	<b>mg</b>

Each block represents 10 units. From one block to another unit, you just count the number of blocks and multiply or divide the amount with 10 e.g.:

- From kg to g: 3 blocks so it  $(\times 10 \times 10 \times 10)$  equals to 1 000.
- From g to mg: 3 blocks so it  $(\times 10 \times 10 \times 10)$  equals to 1 000
- From kg to mg 6 blocks so it  $(\times 10 \times 10 \times 10 \times 10 \times 10 \times 10)$  equals to 1 000 000.

Instruments which we use for mass:

- **Bathroom scale:** To weigh a person's weight.



- **Kitchen scale:** To weigh any items in the kitchen.



- **Balance:** A balance is an instrument for weighing or comparing masses or weight.



HooHoo Wiskunde

## 4.3 CAPACITY AND VOLUME

### Capacity:

Capacity is how much something CAN hold. It is usually measured in litres and millilitres.

### Volume:

Volume is the amount of space taken by the liquid.

NAME	ABBREVIATIONS	MEASURING
millilitre	ml	To measure very light objects
litre	ℓ	To measure light objects
kilolitre	kl	To measure lighter objects

1 cup = 250 ml

$\frac{1}{2}$  cup = 125 ml

$\frac{1}{4}$  cup = 62,5 ml

1 teaspoon = 5 ml

$\frac{1}{2}$  teaspoon = 2,5 ml

$\frac{1}{4}$  teaspoon = 1,5 ml

1 table spoon = 15 ml

1 kl = 1 000 ℓ

1 ℓ = 1 000 ml



### CONVERSION OF UNITS:

	King	Henry	Died	By	Drinking	Chocolate	Milk
	Kilo	Hecto	Deca	Unit	Desi	Centi	Milli
ℓ	kl	hm	dm		dm	cg	ml

Each block represents 10 units. From one block to another unit, you just count the number of blocks and multiply or divide the amount with 10 e.g.:

- From kl to l: 3 blocks so it (x10x10x10) equals to 1 000.
- From l to ml: 3 blocks so it (x10x10x10) equals to 1 000
- From kl to ml 6 blocks so it (x10x10x10x10x10x10) equals to 1 000 000.

Instruments which we use:

- **Measuring spoons:** For measurements smaller than 50ml.



- **Measuring cup:** For measurements up to 250ml.



- **Measuring cup:** To measure the content of litres.



Hoo Wiskunde

## 4.4 TIME

Time: It is measured in units as seconds, minutes, hours, days, weeks, months and years. Clocks and watches are used to tell time and calendar to show us the date.

1 year = 365 days
leap year = 366 days
1 year = 52 weeks
1 year = 12 months
1 year = 4 seasons
1 year = 4 year
1 quarter = 3 months
1 week = 7 days
10 year = 1 decade
100 year = 1 century
1000 year = 1 millennium

### Days of the week:

Monday	Maandag
Tuesday	Dinsdag
Wednesday	Woensdag
Thursday	Donderdag
Friday	Vrydag
Saturday	Saterdag
Sunday	Sondag

### Months of the year

1	January	Januarie
2	February	Februarie
3	March	Maart
4	April	April
5	May	Mei
6	June	Junie
7	July	Julie
8	August	Augustus
9	September	September
10	October	Oktober
11	November	November
12	December	Desember



### The total days of each month:

We use our knuckles to determine the days of each month. The knuckles are the months with 31 days. The spaces between the knuckles are the months with 30 days except February.

Months with 31 days: January, March, May, July, August, October and December.

Months with 30 days: April, June, September, November.

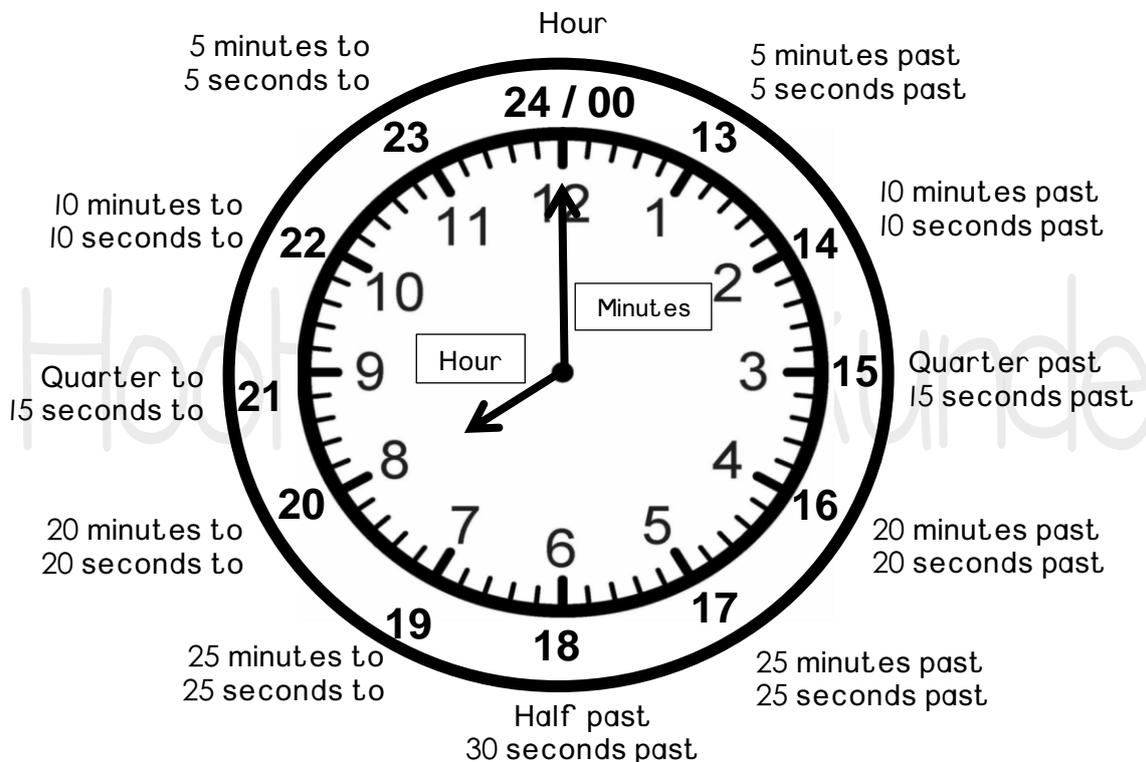
February is the only month with 28 days in a normal year and 29 days in a leap year.



**ANALOUQUE TIME:**

Time	Morning (am.)	Evening (pm.)
Eight o'clock	8.00 am.	8.00 pm.
Two o'clock	2.00 am.	2.00 pm.
Hal past 10	11.30 am.	11.30 pm.
Quarter to 11	10.45 am.	10.45 pm.
Quarter past 3	3.15 am.	3.15 pm.
20 min. after 3	3.20 am.	3.20 pm.
1 min. past twelve	0.01 am.	12.01 pm.

**ANALOOG HORLOSIE EN TYD:**



**DIGITAL TIME:**

14 : 20 : 16

Hour : minutes : seconds

**Addition and subtraction of time:**

a) 14 hours, 8 min + 27 hours, 16 min = 41 hours and 24 minutes

$$\begin{array}{r} 14 \text{ hours, } 8 \text{ min} \\ + 27 \text{ hours, } 16 \text{ min} \\ \hline 41 \text{ hours, } 24 \text{ min} \end{array}$$

b) 7 days, 44 hours + 9 days, 21 hours = 17 days and 41 hours

$$\begin{array}{r} 7 \text{ days, } 44 \text{ hours} \\ + 9 \text{ days, } 21 \text{ hours} \\ \hline 16 \text{ days, } 65 \text{ hours} \end{array}$$

$$\begin{array}{r} 65 \text{ hours} - 24 \text{ hours} = 41 \text{ hours} \\ 16 \text{ days} + 1 \text{ day} = 17 \text{ days} \\ \hline 17 \text{ days and } 41 \text{ hours} \end{array}$$

c) 14 hours, 8 min + 27 hours, 16 min = 41 hours and 24 minutes

$$\begin{array}{r} 14 \text{ hours, } 8 \text{ min} \\ + 27 \text{ hours, } 16 \text{ min} \\ \hline 41 \text{ hours, } 24 \text{ min} \end{array}$$

d) 7 days, 44 hours + 9 days, 21 hours = 4 days, 8 hours and 24 minutes

$$\begin{array}{r} 12 \text{ days, } 44 \text{ hours, } 38 \text{ minutes} \\ - 8 \text{ days, } 36 \text{ hours, } 14 \text{ minutes} \\ \hline 4 \text{ days, } 8 \text{ hours, } 24 \text{ minutes} \end{array}$$

e) 28 days, 7 hours - 22 days, 12 hours = 5 days and 19 hours

$$\begin{array}{r} 2728 \text{ days, } 317 \text{ hours} \text{ (} 24 \text{ hours} + 7 \text{ hours} = 31 \text{ hours)} \\ - 22 \text{ days, } 12 \text{ hours} \\ \hline 5 \text{ days, } 19 \text{ hours} \end{array}$$

**Multiply and division of time:**

a) 12 hours and 10 min. x 5 = 2 days, 12 hours and 50 minutes

$$\begin{array}{r} 12 \text{ hours, } 10 \text{ min} \\ \quad \quad \quad \times 5 \\ \hline \end{array}$$

60 hours, 50 min

24 hours in 'n day – convert 60 hours to days

$$60 \div 24 = 2 \text{ days and } 12 \text{ hours}$$

2 days, 12 hours and 50 minutes

b) 6 days and 3 hours x 8 = \_\_\_

6 days, 2 hours

X 8

**48 days, 16 hours**

48 days:

**30 days: 1 month, 18 days 16 hours**

**31 days: 1 month, 17 days and 16 hours**

c) 15 hours and 35 minutes ÷ 5 = **3 hours and 7 minutes**

$$\begin{array}{r} 3 \text{ hours } 7 \text{ min} \\ 5 \overline{) 15 \text{ hours } 35 \text{ min}} \end{array}$$

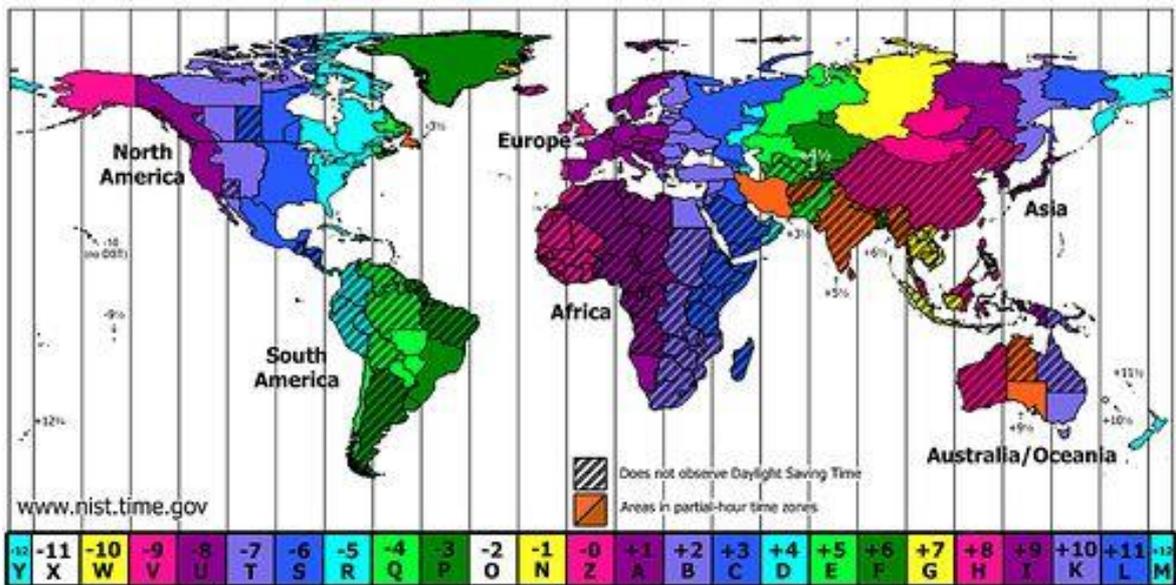
d) 82 years and 10 months ÷ 2 = **41 years and 5 months**

$$\begin{array}{r} 41 \text{ years } 5 \text{ months} \\ 2 \overline{) 82 \text{ years } 10 \text{ months}} \end{array}$$

### The duration of time:

Begin	Duration of time	End
02:00	6 hours	08:00
10:00	3 hours	13:00
14:15	8 hours	22:15
08:30	30 minutes	09:00
10:45	5 hours, 15 minutes	16:00

## Time zones:



## Know when to add or subtract:

- + and + = minus
- - and - = minus
- + and - = plus

*Move to right: ADD*

*Move to left: SUBTRACT*

## What is the time difference?

- +6 and +4 (+ and + indicates subtraction)  
 $6-4 = 2$   
There is a 2-hour difference.
- 7 and -12 (- and - indicates subtraction)  
 $12-7 = 5$   
There is a 5 hours difference.
- 2 and +10 (+ and - indicates addition)  
 $10+2=12$   
There is a 12 hours difference.

Problem solving with time:

- a) If it is 10:00 in Johannesburg, what will the time be in New York?

Johannesburg: +2  
New York: -4  
+2 and -4:  
 $2+4 = 6$  hours difference.

I move to the left: Subtract time  
 $10:00 - 6 \text{ hours} = 04:00$   
It is 04:00 in the morning in New York.

- b) If it is 22:30 in Australia, what will the time be in Italy?

Australia: +10  
Italy: +2  
+10 and +2:  
 $10-2 = 8$  hours difference

I move to the left: Subtract time  
 $22:30 - 8 \text{ hours} = 15:30$   
It is 15:30 in the afternoon in Italy.

- c) If it is 16:45 in Brazil, what will the time be in Durban?

Brazil: -2  
Durban: +2  
+2 and -2:  
 $2+2 = 4$  hours difference

I move to the right: Add time  
 $16:45 + 4 \text{ hours} = 20:45$   
It is 20:45 in the evening in Durban.

- d) If it is 12:00 in Japan, what will the time be in New Zealand?

Japan: +9  
New Zealand: +12  
+9 and +12:  
 $12-9 = 3$  hours difference

I move to the right: Add time  
 $12:00 + 3 \text{ hours} = 15:00$   
It is 15:00 in the afternoon in New Zealand.

## 4.5 TEMPERATURE

### Temperature:

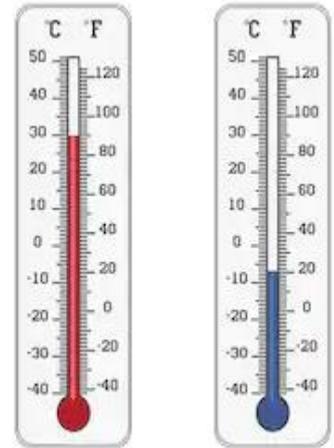
We use a thermometer to measure temperature in degrees Celsius. Some of the other countries use Fahrenheit to measure temperature.

Degrees Celsius: °C

Degrees Fahrenheit: °F

You need to know that hot or cold things are when described in degrees Celsius.

- The freezing point of pure water is 0°C
- The boiling point of pure water is 100°C
- The average normal human body temperature is 37°C



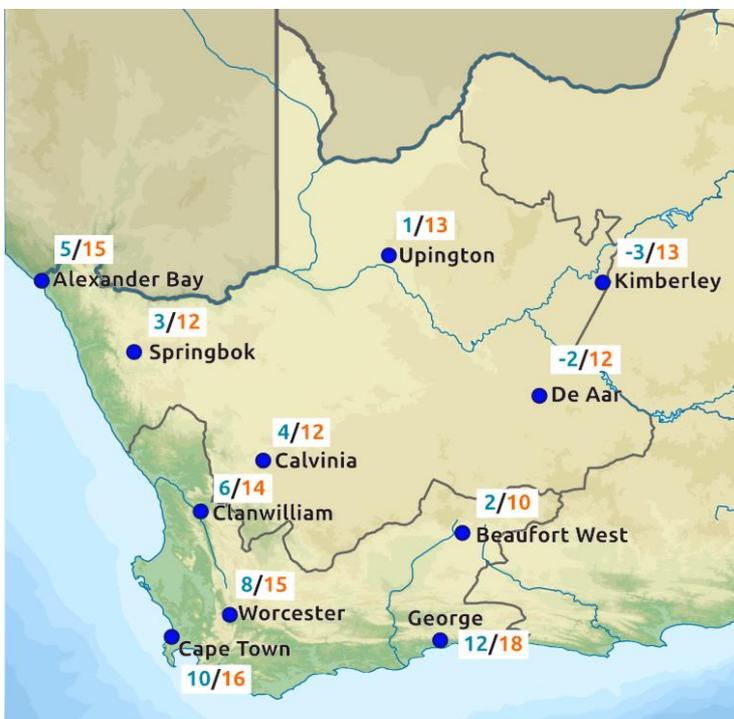
### Maximum and minimum temperature:

When we look at a weather report, we always see two types of temperatures. Mostly the temperatures on the left will be the minimum and the temperatures on the right will be the maximum.

### Cape Town:

Minimum: 10° C

Maximum 16° C



## 4.6 PERIMETER, AREA AND VOLUME

### 1. Perimeter:

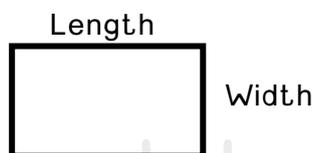
The perimeter is the distance all the way around a certain shape. It is measured in different types of length: mm, cm, m and km.

$$\begin{aligned} \text{Perimeter} &= \text{length} + \text{width} + \text{length} + \text{width} \\ &= (2 \times \text{length}) + (2 \times \text{width}) \end{aligned}$$

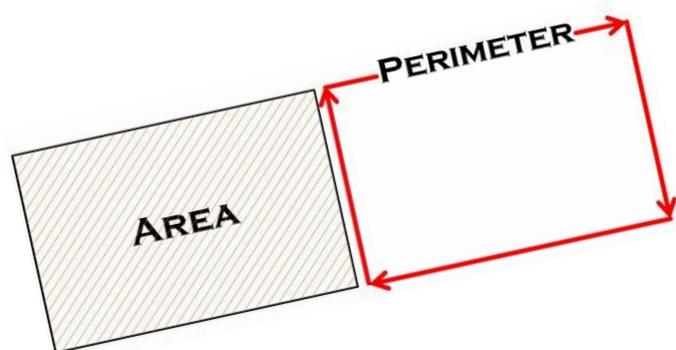
### 2. Area:

The area of a shape is how much surface the shape has. Area is measured in square units such as square centimetre (cm<sup>2</sup>), square metre (m<sup>2</sup>) and square kilometre (km<sup>2</sup>).

$$\text{Area} = \text{length} \times \text{width}$$



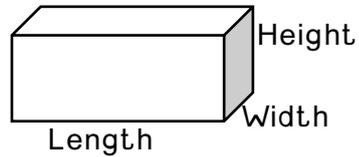
SHAPE	DRAWING	PERIMETER FORMULA	AREA FORMULA
Square		Perimeter = side + side + side + side Perimeter = 4 x side	Area = side x side = l x w
Rectangle		Perimeter = (2 x l) + (2 x w) Perimeter = 2 x (l + w)	Area = l x w
Triangle		Perimeter = side + side + side	

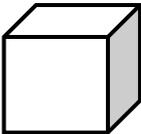
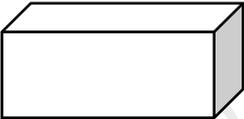


### 3. Volume:

Volume is the amount of space taken up by any solid shape.  
When measuring volume, cubic units are used:  $\text{mm}^3$ ,  $\text{cm}^3$ ,  $\text{m}^3$  and  $\text{km}^3$ .

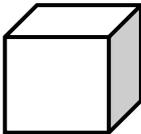
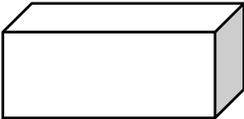
$$\text{Volume} = \text{length} \times \text{width} \times \text{height}$$



SHAPE	DRAWING	VOLUME FORMULA
Cube		$\text{Vol} = \text{side} \times \text{side} \times \text{side}$
Rectangular prism		$\text{Vol} = l \times w \times h$

### 4. Total surface area:

The total surface area of a solid shape is the sum of the areas of all of the faces or surfaces. It includes the top and bottom, left and right and front and behind side of the solid.

SHAPE	DRAWING	TOTAL SURFACE AREA FORMULA
Cube		$\text{TSA} = 6 \times (\text{side} \times \text{side})$
Rectangular prism		$\text{TSA} = 2 \times (l \times w) + 2 \times (w \times h) + 2 \times (l \times h)$



# DATA HANDLING



## 5.1 COLLECTING AND ORGANISING DATA

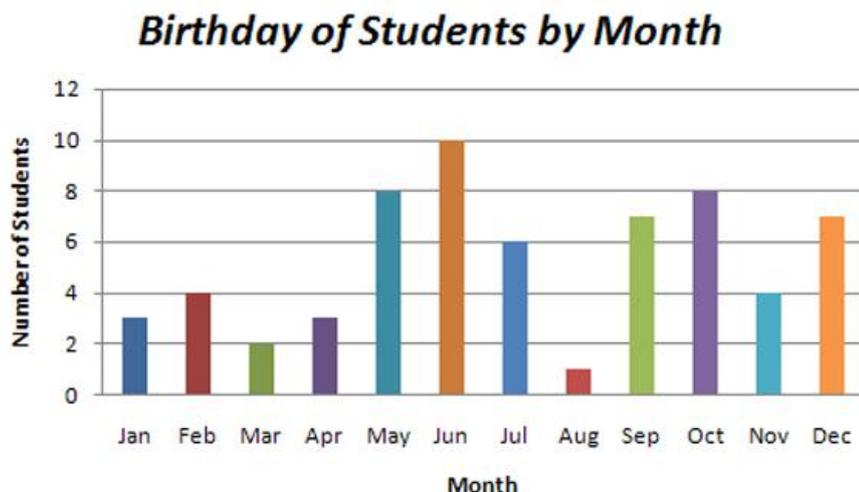
1. Collecting data by investigating a problem.
2. You can use a simple questionnaire (yes/no type response) to collect some data.
3. To organise the data, you can order it from the smallest group to the largest group.
4. Some types of questionnaires:
  - You can make use of tables
  - Yes or no responses
  - Tally marks
  - True or false questions

## 5.2 REPRESENTING DATA

Data can be presented in any of the following graphs:

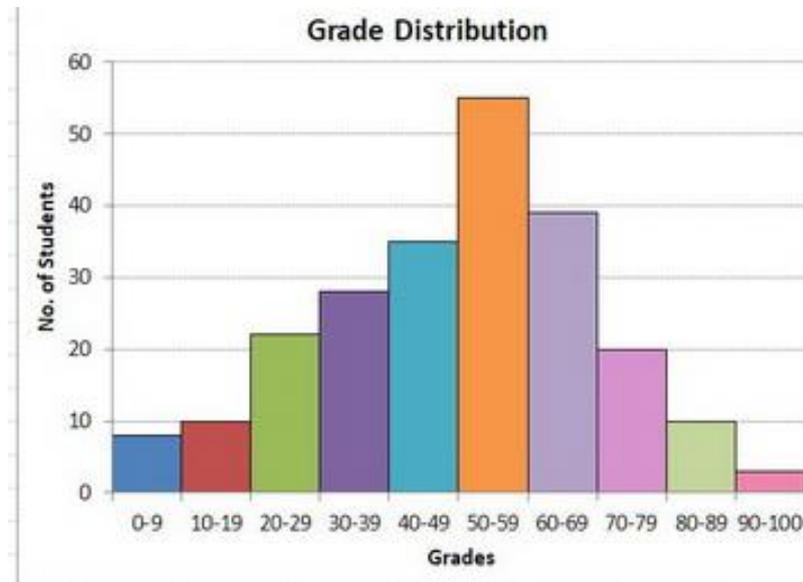
### Bar graphs:

- A bar graph is a graph that uses bars to show the information.
- The bars are all the same thickness and it can be horizontal or vertical.
- There are spaces between the bars.
- There should be a heading on top of the graph.
- At the left-hand side is the number intervals.
- At the bottom is the different aspects or information.



### Double bar graphs:

- A double bar graph is the same as a bar graph but has no spaces between the bars.



### Pictogram:

- In a pictogram pictures are used to stand for the quantities.
- A picture can be for one thing or for a number of things.
- Pictograms can also be called pictographs or picture graphs.
- There should be a key with a picture with your pictogram to indicate for how many quantities one picture is equal to.

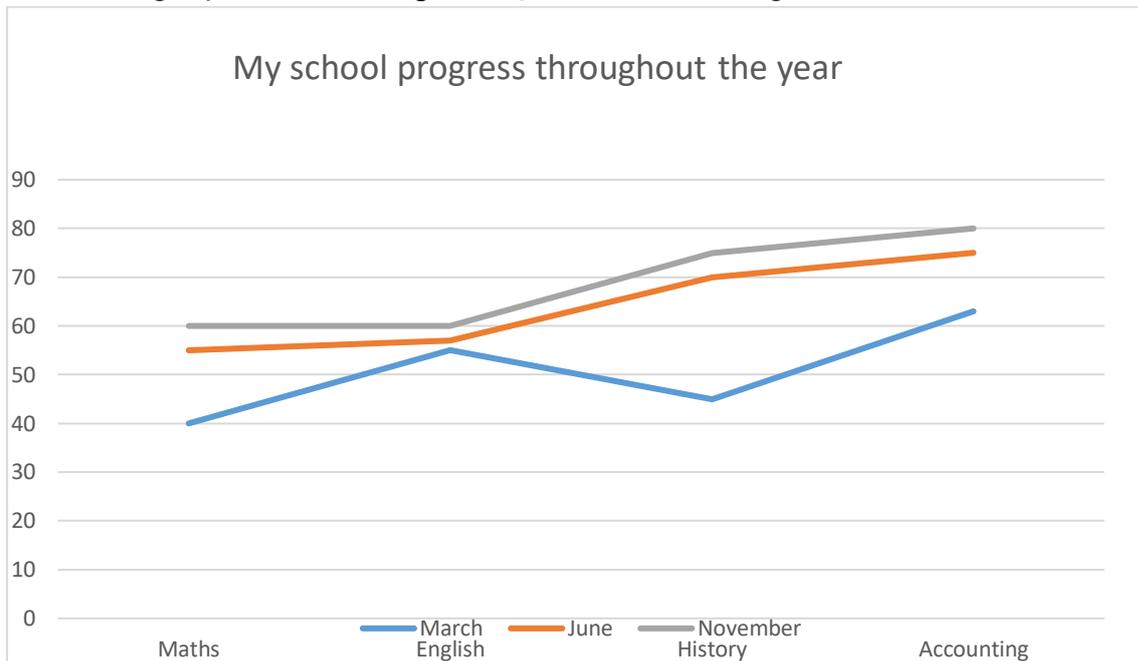
### PICTOGRAM:

Rugby	
Netball	
Tennis	
Hockey	
Soccer	

 = 20

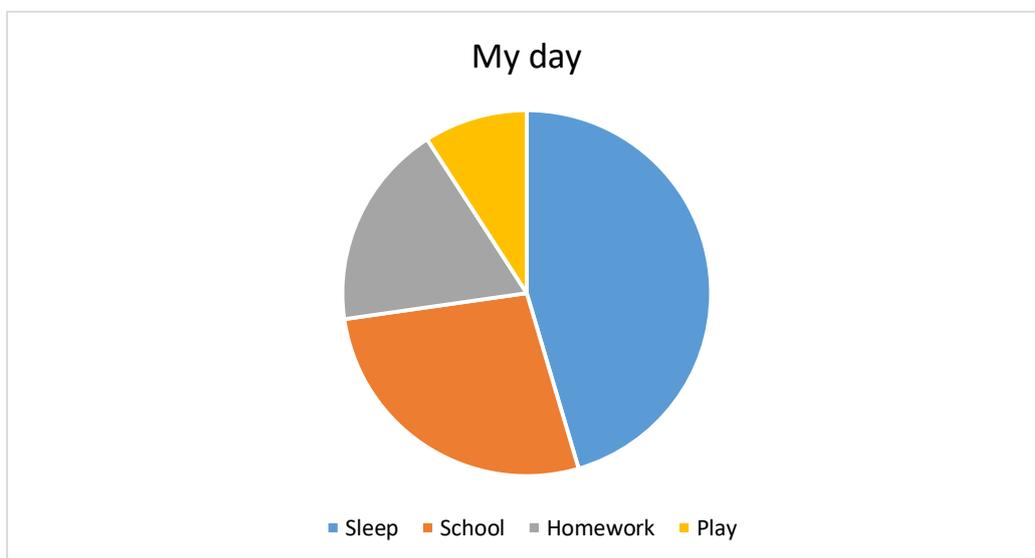
### Line graphs:

- A line graph is where two categories are being presented.
- A line graph is shown by the quantities through a line.



### Pie charts:

- A pie chart's information is shown as a circle.
- The different-sized slices stand for the different quantities.



### Frequency:

- A frequency is how often something happens.
- Tally marks are often used to show the frequency in a frequency chart or diagram.
- A tally is a mark which shows how often something happens.
- Tally marks are grouped by 5 lines, four vertical lines and one horizontal line which go through all the other tally marks.  $\text{||||}$

Information	Tally	Frequency
Apples		2
Bananas		5
Grapes		7

## 5.3 ANALYSING, INTERPRETING AND REPORTING DATA

The interpretation of information that is being presented can be analysed. We use mode, mean, median, average and range to report the data that was being used.

### MODE AND MEDIAN

**MODE:** The mode is the quantity or number that occurs the most.

**MEDIAN:** The median is the quantity that has the middle value when the quantities are written in order.

Mark out of 10: 7; 4; 9; 6; 4; 10; 8; 5; 3

Write in order: 3; 4; 4; 5; 6; 7; 8; 9; 10

**MODE:** 4

**MEDIAN:** 6

Mark out of 20: 15; 14; 12; 20; 12; 11; 18; 7.

Write in order: 7; 11; 12; 12; 14; 15; 18; 20

**MODE:** 12

**MEDIAN:**  $(12 + 14) \div 2 = 13$

## 5.4 PROBABILITY

### Probability:

Probability is a measure of the likelihood of an event.  
The probability of an event is any number from 0 to 1.

### Certain:

A probability of 1 means an event is certain to occur.

### Impossible:

A probability of 0 means an event is impossible.

#### 1. ROLL A DIE OR DICE:

The probability of getting a possible number is a chance out of 6 if you have one die and 12 if you have two dice.



#### 2. TOSS A COIN

The probability of getting heads is 1 in 2.



#### 3. SPINNER:

Each number on the spinner is one possible outcome, or result of spinning the spinner. The sample space or the set of all possible outcomes are {1, 3, 5, 7, 9, 11, 13, 15}.

