STATISTICS MEMORANDUM

Worksheet 7 A

1. 8; 11; 15; 15; 21; 22; 22; 22; 24; 26; 31; 33; 36; 36; 78; 83

1.1 $\bar{x} = \frac{483}{16} = 30{,}2$

1.2 Mode = 22

1.3 Median = $\frac{22 + 24}{2} = 23$

1.4 $Q_1 = \frac{15 + 21}{2} = 18$

1.5 $Q_3 = \frac{33 + 36}{2} = 34{,}5$

1.6 range = 83 – 8 = 75

1.7 IQR = 34,5 – 18 = 16,5

1.8 Semi IQR = $\frac{16{,}5}{2} = 8{,}25$

1.9 outliers:

Q_3 + (1,5 x IKV)

=34,5 +(1,5 x 6,5) = 59,25

$\therefore$ outliers are 78 and 83

2.1 $(20 + 2x + 15 + 30 + 32 + 42 + x + 21 + 22 + 18)$

$= 200 + 3x$

$\therefore \bar{x} = \frac{200 + 3x}{10} = 23$

$\therefore 3x = 30$

$\therefore x = 10$

2.2 $\therefore$10; 15; 18; 20; 20; 21; 22 30; 32; 42

$\therefore$Median = $\frac{20 + 21}{2} = 20{,}5$

$Q_1 = 18$

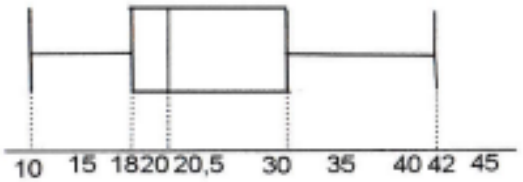
$Q_3 = 30$

Minimum value = 10

Maximum value = 42

Worksheet 7 A

2.2



3.1 50%

3.2 65 – 55 = 10

3.3 75 – 15 = 60

3.4 Skewed to the left – data is spread out more to the left of the median.

3.5 25%

4. $\frac{100 + 87 + x}{3} = 95$

x = 95 x 3 – 187= 98 kg

5.1

	f	cum f	x_1	$f.x_1$
$0 \le x < 50$	1	1	25	25
$50 \le x < 100$	5	6	75	375
$100 \le x < 150$	6	12	125	750
$150 \le x < 200$	18	30	175	3150
$200 \le x < 250$	14	44	225	3150
$250 \le x < 300$	6	50	275	1650
				9100

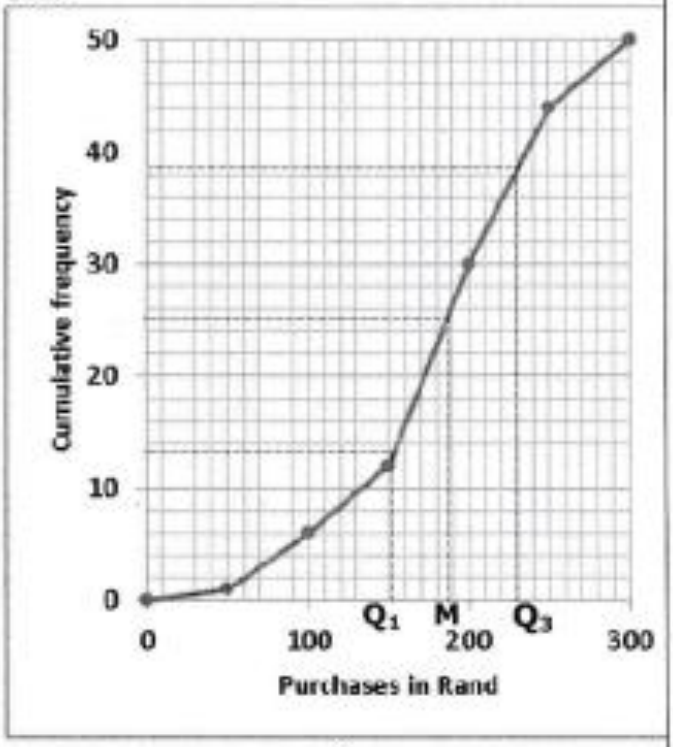
(a) Modal class: $150 \le x < 200$

(a) Median class: $150 \le x < 200$

(c) $\bar{x} = \frac{9100}{50} =$ R182

Worksheet 7 A

5.2



5.3 Position (M) $= \frac{1}{2}(50+1) = 25{,}5$

$\therefore$ M $\approx$ 189

Position (Q_1) $= \frac{1}{4}(50+1) = 12{,}75$

$\therefore$ $Q_1 \approx$ 153

Position (Q_3) $= \frac{3}{4}(50+1) = 38{,}25$

$\therefore$ $Q_3 \approx$ 229

Worksheet 7 C

3. School B
30; 43; 45; 56; 60; 68; 70; 74; 78; 84; 86; 90

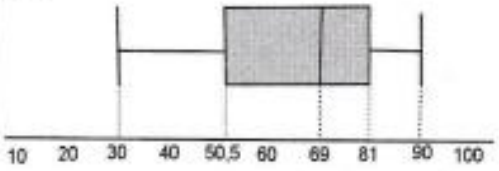
3.1 will draw box and whisker diagram using the data of school B.

3.2 B: $Q_2 = 69$

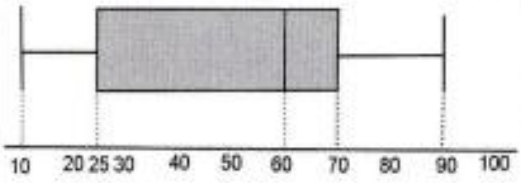
$$Q_1 = \frac{45+56}{2} = 50,5$$

$$Q_3 = \frac{78+84}{2} = 81$$

B:



A:



B perfoms better,because 50% of the class achieved more than 69%.

3.3 IQR = 70 - 25 = 45

3.4 70 - 90

4.1

marks	Cum f	f
$20 \leq x < 30$	4	4
$30 \leq x < 40$	12	8
$40 \leq x < 50$	30	18
$50 \leq x < 60$	48	18
$60 \leq x < 70$	68	20
$70 \leq x < 80$	84	16
$80 \leq x < 90$	94	10
$90 \leq x < 100$	100	6

4.2 18 +20+16+10+6 = 70

Worksheet 7 C

5.1 Sipho: $\bar{x} = \frac{37}{6} = 6,16$

Johan: $\bar{x} = \frac{36}{6} = 6$

5.2

Sipho	$x - \bar{x}$	$(x - \bar{x})^2$
6	-0,16	0,0256
8	1,84	3,3856
7	0,84	0,7056
3	-3,16	9,9856
8	1,84	3,3856
5	-1,16	1,3456
		18,8336

Standard dev.: $\sigma = \sqrt{\frac{18,8336}{6}}$

$= 1,77$

5.2

Johan	$x - \bar{x}$	$(x - \bar{x})^2$
2	-4	16
12	6	36
2	-4	16
10	4	16
3	-3	9
7	1	1
		94

Standard deviation $\sigma = \sqrt{\frac{94}{6}}$

$= 3,96$

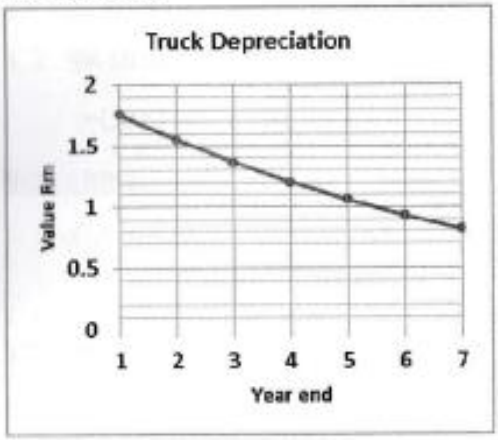
5.3

$\bar{x}$ for both players are almost the same. The standard deviation of Sipho's data is small- which means that his performance level is constant.

4 of Johan's scores are more than one standard deviation from the mean
- data more spread around the mean.
- performance level not constant.

Worksheet C

6.1 and 6.3



6.2 Exponential– multiply by a constant of 0,88 (see below).

6.4 $y = ab^n$

(1;1,760)/ $1{,}760 = ab^1$ ..... ①

$$\therefore a = \frac{1760}{b} \quad \text{.....②}$$

(2; 1,549)/ $1{,}549 = ab^2$ ..... ③

Subst. ② in ③ $1{,}549 = \frac{1760}{b} \times b$

$\therefore b = 0{,}88$

$T_0 = 2\,000\,000$ (starts)
$\therefore a = 2\,000\,000$

$y = ab^n$

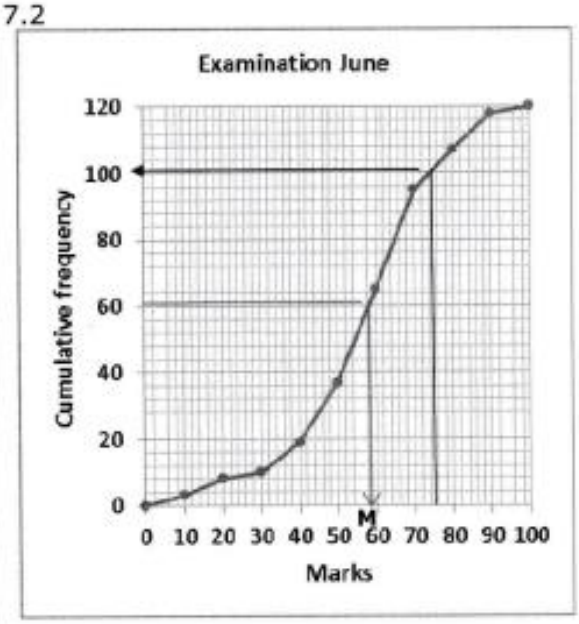
$\therefore W = \mathbf{2\,000\,000(0{,}88)^n}$

Worksheet 7 C

7.1

marks	f	Cum f
$0 \leq x < 10$	3	3
$10 \leq x < 20$	5	8
$20 \leq x < 30$	2	10
$30 \leq x < 40$	9	19
$40 \leq x < 50$	18	37
$50 \leq x < 60$	28	65
$60 \leq x < 70$	30	95
$70 \leq x < 80$	12	107
$80 \leq x < 90$	11	118
$90 \leq x < 100$	2	120

7.2



7.3.1 20 learners

7.3.2 Position(Q_2) $= \frac{1}{2}(n+1) = 60{,}5$

Median ≈ 59 (graph)