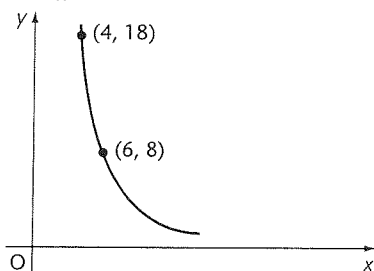
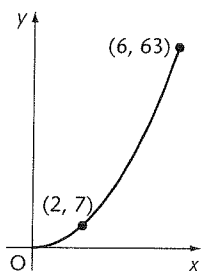


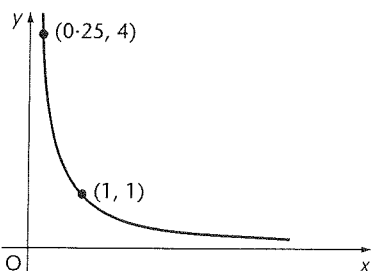
e) $y = \frac{288}{x^2}$



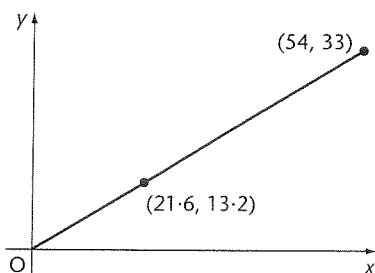
f) $y = \frac{7x^2}{4}$



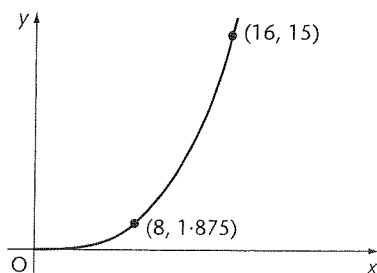
g) $y = \frac{1}{x}$



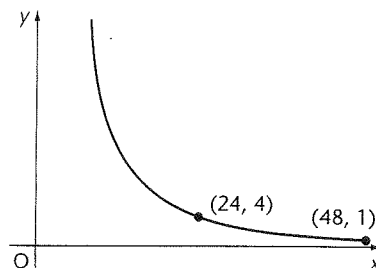
h) $y = \frac{11x}{18}$



i) $y = \frac{15x^3}{4096}$



j) $y = \frac{2304}{x^2}$



Exercise 3.5 (page 31)

- 1 a) (i) $y \propto x^2$ (ii) $y = x^2$
 b) (i) $y \propto x^2$ (ii) $y = 2x^2$
 (iii) 128
 c) (i) $y \propto x^2$ (ii) $y = \frac{1}{3}x^2$
 d) (i) $y \propto x^2$ (ii) $y = 0.4x^2$
 (iii) 490
 e) (i) $y \propto x^2$ (ii) $y = 1.2x^2$
 f) (i) $y \propto \frac{1}{x^2}$ (ii) $y = \frac{225}{x^2}$
 (iii) 1
 g) (i) $y \propto \frac{1}{x^2}$ (ii) $y = \frac{1250}{x^2}$
 h) (i) $y \propto \frac{1}{x^2}$ (ii) $y = \frac{20}{x^2}$
 (iii) 0.2
 i) (i) $y \propto \frac{1}{x^2}$ (ii) $y = \frac{800}{x^2}$
 j) (i) $y \propto \frac{1}{x^2}$ (ii) $y = \frac{256}{x^2}$
 (iii) 1
- 2 a) Multiplied by 4
 b) Multiplied by 2.25
- 3 a) $h = \frac{5}{98}u^2$
 b) 216 m (to the nearest whole number)
- 4 $1.52 \times 10^8 \text{ km}^2$

Revision exercise A1 (page 33)

- 1 a) $600 \times 80 = 48\,000$, 48 140
 b) $60 \div 4 = 15$, 16.63
 c) $\frac{30^2}{0.5} = 1800$, 1668.52
- 2 a) 1.458×10^4
 b) 2.385×10^{-1}
- 3 a) $x^2 + 8x + 7$
 b) $a^2 + 2a - 15$
 c) $2y^2 - 2y - 4$
 d) $2x^2 - 9x - 5$
 e) $4a^2 - 3ab - b^2$
- 4 a) $2a^5$ b) $5a$
 c) a^5 d) $24a^4b^4$
 e) $3xz$ f) $4a^2c$

- 5 a) $3(a + 2b - 4c)$
 b) $a(2 + 3b)$
 c) $ab(a - 3b)$
 d) $2xy(x - 3)$
 e) $7ab(c + 2a)$
 f) $3(3a^2 + b^2 - 2c^2)$
 g) $5(pq - 2)$
 h) $2a(1 - 2a + 3a^2)$
 i) $50ac(2b - 1)$
- 6 a) $(x - 7)(x + 7)$
 b) $(x - 1)(x + 1)$
 c) No factors
 d) $(x - y)(x + y)$
 e) $(11 - b)(11 + b)$
- 7 a) $(x - 9)(x - 7)$
 b) $2(x + 3)(x - 7)$
 c) $(x - 2)(3x - 2)$
 d) $(x + 3)(2x - 5)$
 e) $3(x - 4)(x + 4)$
 f) $(2x + 3)(x - 7)$
 g) $3(2x + 1)(x - 5)$
 h) $(5x - 6)(x - 3)$
 i) $(2x + 1)(4x - 5)$
 j) $(3x + 2)(2x - 5)$
- 8 a) $\frac{x+3}{4}$
 b) $\frac{x+1}{x-2}$
 c) $\frac{2x}{x+3}$
 d) $\frac{x-2}{2x-1}$
 e) $\frac{x+3}{x-5}$
 f) $\frac{3(x+1)}{2x-1}$
- 9 a) $x = -\frac{4}{3}$ or $x = 3$
 b) $x = 3.5$ or $x = -4$
 c) $x = \pm 8$
- 10 a) 0.06 units
 b) $F = \frac{54}{d^2}$
- 11 25, 125, 625, 1, 0.2
- 12 a) (i) $y \propto \frac{1}{x}$
 (ii) $xy = 50$
 b) (i) $y \propto x$
 (ii) $y = 2x$
 c) (i) $y \propto \frac{1}{x}$
 (ii) $xy = 0.2$
 d) (i) $y \propto x^2$
 (ii) $y = 0.025x^2$
- 4 a) $\frac{1}{9}$
 b) 3
 c) 1
 d) $\frac{1}{81}$
 e) 27
- 5 a) 3
 b) 81
 c) $\frac{1}{27}$
 d) 3
 e) 1
- 6 a) 8
 b) $\frac{1}{4}$
 c) 1
 d) 16
 e) 32
- 7 a) 4
 b) $\frac{1}{2}$
 c) 1
 d) 64
 e) 128
- 8 a) 12
 b) 64
 c) $\frac{1}{3}$
 d) 27
- 9 a) 125
 b) 6
 c) 100
 d) $\frac{343}{3} = 114\frac{1}{3}$
- 10 a) 9
 b) 16
 c) $\frac{16}{3} = 5\frac{1}{3}$
 d) 15
- 11 a) 1000
 b) $\frac{2}{25}$
 c) $113\frac{3}{4}$
 d) 0
- 12 a) $1.925\,414 = 1.9254$ (to 5 s.f.)
 b) $21.717\,639 = 21.718$ (to 5 s.f.)
 c) $1.045\,910 = 1.0459$ (to 5 s.f.)
 d) $0.003\,538\,869 = 0.003\,538\,9$ (to 5 s.f.)
- 13 a) $111.5664 = 111.57$ (to 5 s.f.)
 b) $0.020\,596\,29 = 0.020\,596$ (to 5 s.f.)
 c) $1.072\,135 = 1.0721$ (to 5 s.f.)
 d) $0.040\,580\,84 = 0.040\,581$ (to 5 s.f.)
- 14 a) 31
 b) $1.009\,998\,068 = 1.0100$ (to 5 s.f.)
 c) $1.544\,857 = 1.5449$ (to 5 s.f.)
 d) $2.107\,773 = 2.1078$ (to 5 s.f.)
- 15 a) 11
 b) $6.760\,315 = 6.7603$ (to 5 s.f.)
 c) $1.276\,518 = 1.2765$ (to 5 s.f.)
 d) 16
- 16 a) $106.1208 = 106.12$ (to 5 s.f.)
 b) $13.427\,845 = 13.428$ (to 5 s.f.)
 c) $25.304\,39 = 25.304$ (to 5 s.f.)
- 17 a) 145
 b) $7.483\,282 = 7.4833$ (to 5 s.f.)
 c) $1.422\,970 = 1.4230$ (to 5 s.f.)
- 18 a) 3.7711
 b) $2.167\,981 = 2.1680$ (to 5 s.f.)
 c) 0
- 19 a) $3547.171 = 3547.2$ (to 5 s.f.)
 b) $4.732\,081 = 4.7321$ (to 5 s.f.)
 c) $299.532\,0705 = 299.53$ (to 5 s.f.)
- 20 a) 18
 b) 243
 c) $\frac{1}{5}$
 d) 18
 e) 16
 f) 72
 g) $\frac{36}{5} = 7\frac{1}{5}$
 h) 26

4 Indices

Exercise 4.1 (page 38)

- 1 a) $n^{\frac{1}{3}}$
 b) n^{-3}
 c) $n^{\frac{2}{5}}$
 d) $n^{\frac{1}{4}}$
 e) n^4
 f) $n^{\frac{5}{3}}$
- 2 a) $\frac{1}{4}$
 b) 2
 c) 1
 d) $\frac{1}{16}$
 e) 8
- 3 a) 2
 b) $\frac{1}{8}$
 c) 16
 d) 64
 e) 8

- 3 a) 25.7 cm b) 25.9 cm
 c) 25.8 cm d) 26.3 cm
 e) 51.3 cm f) 11.7 cm
- 4 a) 43° b) 100°
 c) 185° d) 58°
 e) 148° f) 57°
 g) 179° h) 203°
 i) 159° j) 62°
 k) 188° l) 257°
- 5 a) 4.9 cm b) 3.4 cm
 c) 4.8 cm d) 5.6 cm
 e) 3.7 cm f) 2.5 cm
 g) 13.4 cm h) 5.55 cm
 i) 4.62 cm
- 6 a) 6.59 cm b) 1.51 cm
 c) 1.81 m
- 7 Blue area = 626 mm^2 (nearest mm^2)
 Black length = 167 mm (nearest mm)
- 8 a) 344 m^2 (nearest m^2)
 b) 77 m (nearest m)
- 9 186.7° , 62.6 cm^2
- 10 208 cm

Exercise 6.2 (page 54)

- 1 a) 18 cm^3 b) 54 cm^3
 c) 70 m^3 d) 50 cm^3
 e) 179 cm^3 f) 30 cm^3
- 2 a) 103 cm^3 b) 314 cm^3
 c) 51.5 cm^3 d) 154 cm^3
 e) 1010 cm^3 f) 181 cm^3
- 3 a) 524 cm^3 b) 998 cm^3
 c) 33.5 mm^3 d) 113 cm^3
 e) 435 cm^3 f) 1988 mm^3
- 4 a) 6.57 cm^3 b) 121 cm^3
- 5 12 cm
- 6 a) 3.6 cm b) 3.1 cm
 c) 6.2 cm
- 7 a) 556 cm^3 b) 2310 cm^3
 c) 4190 cm^3
- 8 a) 6.6 cm b) 12.4 cm
- 9 117 ml
- 10 7.96 cm
- 11 88
- 12 69
- 13 69100 mm^3
- 14 12 cm
- 15 3.17 cm

7 Upper and lower bounds

Exercise 7.1 (page 60)

- 1 a) 61.2 seconds b) 24.51 seconds
 c) 12.4 m d) 1.747 kg
 e) 185 mm f) 12.738 kg
 g) 148.3 cm h) 105.86 seconds
- 2 a) 61 seconds b) 24.49 seconds
 c) 12.38 m d) 1.745 kg
 e) 183 mm f) 12.736 kg
 g) 148.1 cm h) 105.84 seconds

- 3 a) 704 g b) 6.7 cm
 c) 790 g d) 4.4 seconds
 e) 0.16 second f) 76 m
 g) 9000 m h) 0.138 g
- 4 a) 702 g b) 6.5 cm
 c) 770 g d) 4.2 seconds
 e) 0.14 second f) 74 m
 g) 8800 m h) 0.136 g
- 5 50.8 cm
- 6 a) 29.20 seconds b) 1.06 seconds
- 7 UB = 26.5 cm, LB = 23.5 cm
- 8 UB = 3 kg, LB = 2.8 kg
- 9 UB = 1 cm, LB = 0 cm
- 10 a) UB = 13.8, LB = 13.6
 b) UB = 3.6, LB = 3.4

Exercise 7.2 (page 62)

- 1 No
- 2 75 mm
- 3 a) 16.3625 m^2 b) 20.507175 m^2
 c) 56.910875 m^2 d) 40.1625 m^2
- 4 a) 15.5625 m^2 b) 20.415675 m^2
 c) 56.759175 m^2 d) 38.8825 m^2
- 5 a) 1141.7575 cm b) 12.74625 m
 c) 146.625 km d) 11.707275 m
- 6 a) 1131.2875 cm b) 12.51025 m
 c) 138.425 km d) 11.630375 m
- 7 a) 5.08 cm/second b) 1.25 m/second
 c) 10.5 m/second
- 8 a) 5.61 cm/second b) 1.28 m/second
 c) 10.7 m/second
- 9 0.02288 kg/cm^3
- 10 a) 11.7 cm b) 10.6 cm
 c) 20.4 cm
- 11 a) 2.54 cm b) 5.17 cm
 c) 3.66 m
- 12 UB = 844, LB = 830 people/square mile
- 13 UB = 536.25 cm^2 , LB = 490.25 cm^2
- 14 UB = 7.88 m/second, LB = 7.74 m/second
- 15 a) UB = 87.95 cm^3 , LB = 81.37 cm^3
 b) UB = 1702 g, LB = 1566 g
- 16 UB = 84.5, LB = 20.2
- 17 UB = 0.405, LB = 0.384

Revision exercise B1 (page 64)

- 1 a) n^{-1} b) $m^{\frac{1}{3}}$
 c) $n^{\frac{1}{2}}$
- 2 a) $\frac{1}{4}$ b) 1
 c) 5 d) 16
 e) 4 f) $\frac{1}{25}$
 g) 2 h) 32
 i) $1\frac{1}{2}$ j) 144
- 3 a) 625 b) 80
 c) 9 d) 8
 e) 42 f) 500
 g) 4 h) $2\frac{1}{12}$

- 4 a) 2.9242 b) 0.49842
 c) 4096 d) 0.00025674
 5 a) 9 b) 1.6765
 c) 3.9842 d) 512
 6 a) 2^7 b) 3^6
 c) 7^3 d) 3^6

- e) 2^{6n+5}
 7 a) $2^3 \times 5$ b) $2 \times 3^2 \times 5$
 c) $2^3 \times 17$ d) $2^2 \times 3 \times 7^2$

- 8 a) $3^2 \times 5^2$ b) $2 \times 5^{\frac{1}{3}}$
 c) $2^4 \times 7^{\frac{10}{3}}$ d) $2^3 \times 3^{\frac{5}{2}}$

9 a) $a = \frac{2b-5c}{8}$

b) $a = 2b$

10 a) $p = \frac{q}{7}$

b) $p = \frac{2}{2-t}$

c) $p = \frac{qs}{s+q}$

d) $p = \frac{Tq}{2+q}$

e) $p = \frac{1+2a}{4a-1}$

f) $p = \pm \sqrt{2b-4a}$

11 a) 8.51 cm b) 27.7 cm^2

12 a) 66.0° b) 144°

13 a) 6.21 cm b) 4.84 cm

14 7240 cm^3

15 136 m^3

16 UB = 535 g, LB = 505 g

17 a) 31.2 cm b) 8.2 cm

18 a) UB of space 1000.5 mm
 UB of each unit 500.5 mm,
 so UB of two units 1001 mm
 (or other valid explanation).

b) 1.5 mm

19 UB = 101 cm^3 , LB = 94.2 cm^3

20 a) 7.38 m/second b) 7.35 m/second

21 978.75 m

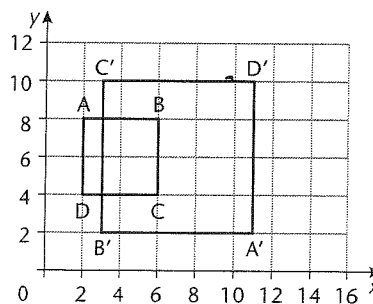
22 602 people/ km^2

- 11 1:1.59
 12 12.6 cm
 13 12.96 m^2
 14 27:64:125
 15 12.5 cm
 16 a) 2 m b) 3 m^2
 c) 18750 cm^3
 17 2.48 m
 18 a) 3.6 m b) 5.76 litres
 19 a) 15 b) 225
 c) 4.52 m^3
 20 15.1 cm
 21 0.0226 m^2 or 226 cm^2
 22 3:30:2.08:3.78 or 1:59:1:1.82
 23 77.44 cm^2

Exercise 8.2 (page 71)

1 a) (1, 8) b) -3

2



3 a) (0, 3) b) -2
 4 a) (2, 3) b) -0.5

9 Probability

Exercise 9.1 (page 77)

1 $\frac{5}{10} = \frac{1}{2}$

2 0.65

3 $\frac{8}{52} = \frac{2}{13}$

4 $\frac{16}{100} = \frac{4}{25}$

5 0.24

6 $\frac{3}{6} = \frac{1}{2}, \frac{1}{4}$

7 $\frac{144}{2704} = \frac{9}{169}$

8 0.56

9 0.85

10 0.04

11 Don't add up to 1

12 a) 0.75 b) 0.175

13 a) $\frac{1}{13}$ b) $\frac{1}{169}$

14 a) 0.6, 0.4 b) 0.24

15 $\frac{1}{144}$

16 $\frac{1}{27}$

17 a) $\frac{15}{23}$ b) $\frac{18}{23}$

18 a) 0.85 b) 0.65

8 Similarity and enlargement

Exercise 8.1 (page 68)

1 a) 4 b) 9

c) 25 d) 16

e) 36 f) 100

2 a) 1000 b) 64

c) 125 d) 8

e) 27 f) 512

3 a) 4 b) 6

c) 8 d) 10

4 25 cm^2

5 a) 72.5 cm^2 b) 18.1 m^2

6 1 litre

7 25.9 cl

8 360 cm^2

9 5.2 m^2

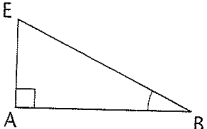
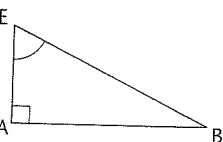
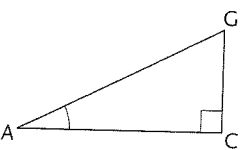
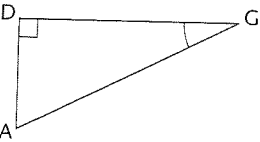
10 1:50

- 12 Yes. $CE = 11.96\text{ m}$ and $AC = 87.3\text{ m}$
 Also $AC = \sqrt{80^2 + 35^2} = 87.3\text{ m}$
- 13 a) 11.0 cm b) 35.5°
 14 a) 10.9 m b) 68.9°
 c) 11.7 m

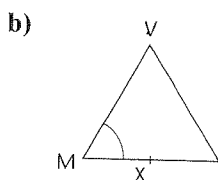
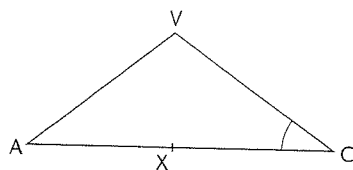
Exercise 10.3 (page 95)

- 1 a) 10.63 units to 2 d.p.
 b) 10.82 units to 2 d.p.
 c) 15.33 units to 2 d.p.
 d) 5.48 units to 2 d.p.
 e) 12.37 units to 2 d.p.
- 2 6 or -6

Exercise 10.4 (page 98)

- 1 a) 
- b) 
- c) 
- d) 

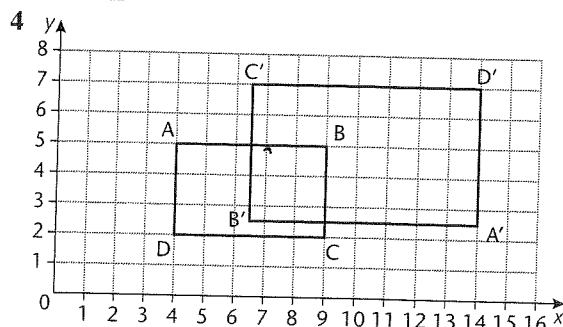
- 2 a) 32° b) 58°
 c) 26.6° d) 32.5°
 3 a) 33.7° b) 36.5°
 4 a)



- 5 a) 65.4° b) 74.6°
 6 67.4°
 7 a) 23.4° b) 49.3°
 8 62.1°
 9 a) 11.6 cm b) 11.7 cm
 10 a) 22.9 cm
 b) (i) 12.6° (ii) 60.8°
 11 35.3° ; all cubes are similar

Revision exercise C1 (page 100)

- 1 a) 180 cm^2 b) $6\text{ cm}; 95\text{ cm}^2$
 c) $614.4\text{ ml}; 1200\text{ ml}$
 2 800 ml
 3 7.42 cm

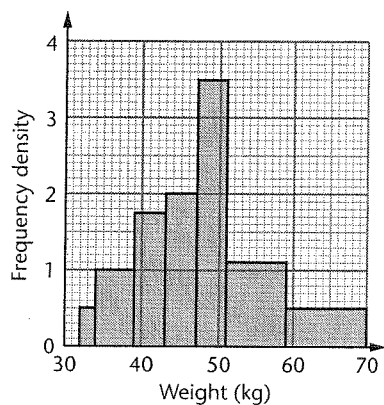


- $A'(14, 2.5), B'(6.5, 2.5), C'(6.5, 7), D'(14, 7)$
- 5 a) $(0, 4)$ b) -2
 6 0.85
 7 0.13
 8 a) 0.09 b) 0.42
 9 a) 0.25 b) 0.75
 c) 0.08
 10 a) 0.01 b) 0.18
 11 0.57
 12 $\frac{11}{60}$
 13 a) 5.39 units b) 9.22 units
 14 a) 56.8° b) 8.96 m
 15 11.0 cm
 16 a) 5.5 units b) 12.4 units
 c) 13 units
 17 a) Angle BHC b) Angle AGB
 18 a) Angle YBV = 51.1°
 b) Angle CAD = 35.0°
 c) 12.8 m
 19 a) 149° b) 5.85 km
 c) 4.9°

- 2 a) Excludes all those who are ex-directory, those without a phone and young people.
 b) Only get people who are using the train at that time. These may not be representative of the population.
 People may not want to take part as they are rushing home from work.
 c) Likely to cover only people who read a lot.
 Not a random selection.

Revision exercise D1 (page 149)

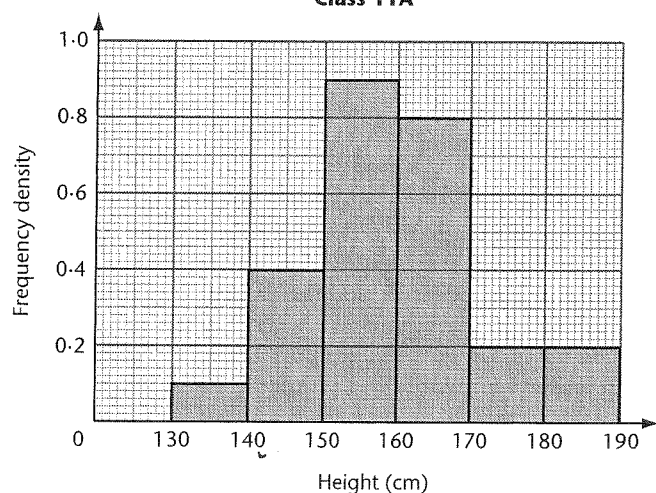
1



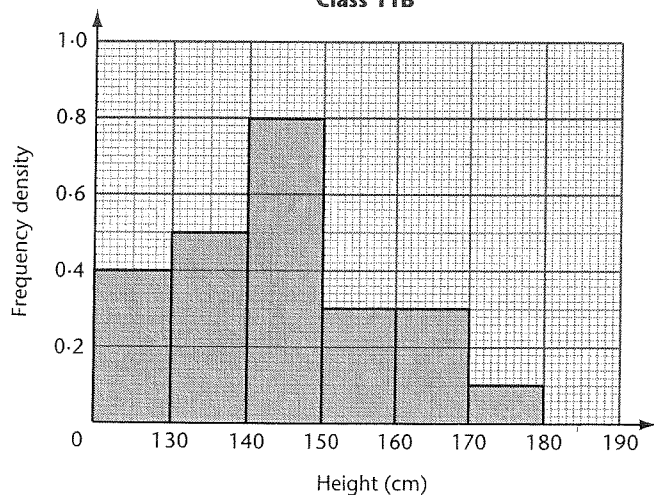
2 50

3

Class 11A



Class 11B



- 4 a) $a = 49^\circ$ (angle at the circumference
 $= \frac{1}{2}$ angle at the centre)
 $b = 131^\circ$ (sum of angles on a straight line)
 b) $c = 120^\circ$ (opposite angles of a cyclic quadrilateral)
 $d = 240^\circ$ (angles at centre and circumference)
 $e = 120^\circ$ (angles at centre and circumference)
 c) Angle at centre $= 160^\circ$ (angles at centre and circumference)
 $f = 10^\circ$ (base angle of isosceles triangle)
 d) Angle DAB $= 70^\circ$ (base angle of isosceles triangle)
 Angle OAB = angle DAB – angle EAO
 $= 70^\circ - 40^\circ = 30^\circ$
 Therefore angle AOB $= 120^\circ$ (angle sum of isosceles triangle)
 Therefore $g = 60^\circ$ (angles at centre and circumference)
 e) Angle at B $= 70^\circ$ (base angle of isosceles triangle)
 Therefore $h = 70^\circ$ (angle between chord and tangent)
 f) $i = 55^\circ$ (base angle of isosceles triangle)
 Therefore $j = 70^\circ$ (angle sum of triangle)
 $k = 55^\circ$ (angle between chord and tangent)
 $l = 70^\circ$ (angle between chord and tangent)
 g) Third angle of triangle $= 70^\circ$ (angle between chord and tangent)
 Therefore $m = 70^\circ$ (base angle of isosceles triangle)
 $n = 40^\circ$ (angle sum of a triangle)
 h) $o = 25^\circ$ (angles in same segment)
 Third angle of triangle $= 80^\circ$ (vertically opposite angles)
 $p = 75^\circ$ (angle sum of a triangle)
 i) $q = 62^\circ$ (angles at centre and circumference)
 $r = 28^\circ$ (base angles of isosceles triangle)
 $s = 29^\circ$ (angle sum of a triangle)
 j) $t = 5.66 \text{ cm to 2 d.p.}$ (Pythagoras)
 $u = 38.9^\circ \text{ to 1 d.p.}$ (trigonometry)
- 5 a) $y = \frac{1}{2}x + 2$ or $2y = x + 4$
 b) $y = -\frac{15}{8}x + 15$ or $15x + 8y = 120$
 c) $y = \frac{5}{3}x - 1$ or $3y = 5x - 3$
 6 a) $y = 3x + 2$
 b) $y = -2x + 6$ or $2x + y = 6$
 c) $y = \frac{1}{2}x + 5$ or $2y = x + 10$
 7 a) $y = \frac{5}{2}x - 10$ or $2y = 5x - 20$
 b) $y = \frac{2}{5}x + \frac{8}{5}$ or $5y = 2x + 8$
 c) $3x + y = 9$
 8 AB: $x + 3y = 14$
 BC: $y = 2x - 7$
 AC: $5x + y = 14$
 9 a) $y = 7x - 34$
 b) $2y = 5x - 20$
 c) $5x + 4y = 6$
 10 a) $x + 2y = 4$
 b) $3x + 2y = 2$
 c) $2y = 5x - 11$
 11 Yes – random sample of subscribers.
 12 a) Random sample but limited to those with library card.
 b) Stratified sample, 1% of each group.
 13 a) No – because the number of pupils is significantly different.
 b) 14
 14 8, 12, 31, 6, 3
 15 No – using whole crop from one tree, though this has been selected at random. A better sample would be one apple from each of 50 trees selected at random.
 16 a) Number all the members.
 Use a random number table or the random number generating facility on a calculator to select 50 of the numbers.
 b) If there were 200 members, for example, then 1 in 4 need to be selected.
 Use a random number table to choose a number between 1 and 4.
 Starting with that number, keep adding 4.
 This will give the required 50 members for the sample.
 c) Divide the members into groups, by age or sex, for example.
 Work out the proportion of the 50 needed from each group.
 Select these randomly using systematic or simple random sampling.