Answers

Page 7

1. a) P(dissat.) $= \frac{60}{290} = 0.207$ (3 dp)

b) P(civil) $= \frac{155}{290} = 0.534$ (3 dp)

c) P(civil and dissatisfied)

$= \frac{30}{290} = 0.103$ (3 dp)

d) P(satisfied given elect.)

$= \frac{57}{75} = 0.76$

e) P(satis. given chem or elect.)

$= \frac{105}{135} = 0.778$ (3 dp)

2. a) P(low cal.) $= \frac{28}{75} = 0.373$ (3 dp)

b) P(medium fibre)

$= \frac{34}{75} = 0.453$ (3 dp)

c) P(low fibre and calories)

$= \frac{15}{75} = 0.2$

d) P(medium or high fibre)

$= \frac{52}{75} = 0.693$ (3 dp)

e) P(high cal. given low in fibre)

$= \frac{8}{23} = 0.348$ (3 dp)

f) P(low cal. given high in fibre)

$= \frac{3}{18} = 0.167$ (3 dp)

Page 8

3. a) P(under 25 one or more)

$= \frac{81}{256} = 0.316$ (3 dp)

b) P(3+ claims and 25 or over)

$= \frac{21}{38} = 0.553$ (3 dp)

c) P(1-2 claims and under 25)

$= \frac{64}{176} = 0.364$ (3 dp)

Page 8 cont...

4. a) P(migrant went to Aust.)

$= \frac{49\,016}{113\,362} = 0.432$ (3 dp)

b) P(Pacific | 2015)

$= \frac{1\,756}{57\,396} = 0.031$ (3 dp)

c) P(2015 | Australia)

$= \frac{25\,246}{49\,016} = 0.515$ (3 dp)

5. a) P(takes biology)

$= \frac{46}{72} = 0.639$ (3 dp)

b) P(physics takes chemsitry)

$= \frac{13}{29} = 0.448$ (3 dp)

c) P(biology takes chemistry)

$= \frac{16}{46} = 0.348$ (3 dp)

d) P(bio. takes phy. & chem.)

$= \frac{5}{46} = 0.109$ (3 dp)

Page 9

6. a) P(winning home game)

$= \frac{21}{24} = 0.875$

b) P(if won was away game)

$= \frac{8}{29} = 0.276$ (3 dp)

c) P(if lost was home game)

$= \frac{3}{13} = 0.231$ (3 dp)

7. a) P(under 40 years of age)

$= \frac{55}{160} = 0.344$ (3 dp)

b) P(given female ≥ 40)

$= \frac{65}{85} = 0.765$ (3 dp)

c) P(given < 40 male)

$= \frac{35}{55} = 0.636$ (3 dp)

Page 9 cont...

8. a) P(non-smoker)

$= \frac{40}{100} = 0.4$

b) P(cancer or heart disease)

$= \frac{52}{100} = 0.52$

c) P(can. or hrt. given smokes)

$= \frac{43}{60} = 0.717$ (3 dp)

d) P(can. or hrt. given heavy)

$= \frac{28}{35} = 0.80$

e) P(heavy died can. or hrt.)

$= \frac{28}{100} = 0.28$

9. a) P(hypertensive)

$= \frac{44}{220} = 0.2$

b) P(male given hypertensive)

$= \frac{40}{77} = 0.519$ (3 dp)

c) P(normal given female)

$= \frac{53}{106} = 0.5$

Page 10

10. a)

	M	F	Total
Coffee	65	140	205
Tea	70	50	120
Other	15	60	75
Total	150	250	400

b) P(male) $= \frac{150}{400} = 0.375$

c) P(orders coffee)

$= \frac{205}{400} = 0.513$ (3 dp)

d) P(orders tea given male)

$= \frac{70}{150} = 0.467$ (3 dp)

e) P($\neq$ tea or coff. given female)

$= \frac{60}{250} = 0.24$

Page 10 Q10 cont...

f) P(coffee given a male)

$= \frac{65}{150} = 0.433$ (3 dp)

g) P(man given other beverage)

$= \frac{15}{75} = 0.2$

11. a) Non-smokers = 210

b) Proportion = 0.475

c) P(smks. and parents non-smk)

$= \frac{3}{40} = 0.075$

d) P(fam. smk. given non-smk.)

$= \frac{8}{21} = 0.381$ (3 dp)

e) From homes where both parents smoke 60% of individuals ended up being smokers. From homes where one parent smokes only 50% of individuals ended up smoking and from homes where no parent smoked only 25% of individuals ended up smoking. So it appears it is true.

Page 13

12. a)

White \ Red	1	2	3	4	5	6
1	1,1	1,2	1,3	1,4	1,5	1,6
2	2,1	2,2	2,3	2,4	2,5	2,6
3	3,1	3,2	3,3	3,4	3,5	3,6
4	4,1	4,2	4,3	4,4	4,5	4,6
5	5,1	5,2	5,3	5,4	5,5	5,6
6	6,1	6,2	6,3	6,4	6,5	6,6

b) P(diff.) $= \frac{30}{36} = 0.833$ (3 dp)

c) P(R < W) $= \frac{15}{36} = 0.417$ (3 dp)

d) P(= 3) $= \frac{11}{36} = 0.306$ (3 dp)

e) P(diff = 2) $= \frac{8}{36} = 0.222$ (3 dp)

f) P(W fac. R) $= \frac{14}{36} = 0.389$ (3 dp)

g) P(tot. ≤ 9) $= \frac{30}{36} = 0.833$ (3 dp)

h) P(= 2) $= \frac{10}{36} = 0.278$ (3 dp)

Page 13 cont...

13. a)

Yellow \ Red	1	2	3	4
1	1,1	1,2	1,3	1,4
2	2,1	2,2	2,3	2,4
3	3,1	3,2	3,3	3,4
4	4,1	4,2	4,3	4,4

b) P(= 1) $= \frac{6}{16} = 0.375$

c) P(both 1) $= \frac{1}{16} = 0.0625$

d) P(both diff.) $= \frac{12}{16} = 0.75$

e) P(sum = 5) $= \frac{4}{16} = 0.25$

f) P(diff = 2) $= \frac{4}{16} = 0.25$

g) P(R > Y) $= \frac{6}{16} = 0.375$

Page 14

14. a) P(sec. male) $= \frac{1}{2} = 0.5$

b) P(both male) $= \frac{1}{4} = 0.25$

c) P(both same) $= \frac{1}{2} = 0.5$

d) P(third fem.) $= \frac{1}{2} = 0.5$

15. a) P(J clubs) $= \frac{1}{52} = 0.019$ (3 dp)

b) P(black card) $= \frac{26}{52} = 0.5$

c) P(= 5) $= \frac{4}{52} = 0.077$ (3 dp)

d) P(J, Q, K) $= \frac{12}{52} = 0.231$ (3 dp)

e) P(J giv. bl) $= \frac{1}{26} = 0.038$ (3 dp)

f) P(J given J, Q, K)

$= \frac{4}{12} = 0.333$ (3 dp)

16. a) P(dark) $= \frac{8}{15} = 0.533$ (3 dp)

b) P(first two dark)

$= \frac{56}{210} = 0.267$ (3 dp)

Page 14 Q16 cont...

c) P(first dark, sec milk)

$= \frac{56}{210} = 0.267$ (3 dp)

d) P(dark, milk) $= \frac{7}{14} = 0.5$

e) P(dark, milk any order)

$= \frac{8}{15} = 0.533$ (3 dp)

17. a) P(both green)

$= \frac{1}{64} = 0.016$ (3 dp)

b) P(first blue, sec red)

$= \frac{12}{64} = 0.188$ (3 dp)

c) P(R, G in any order)

$= \frac{6}{64} = 0.094$ (3 dp)

d) P(both blue)

$= \frac{12}{56} = 0.214$ (3 dp)

e) P(red, green any order)

$= \frac{6}{56} = 0.107$ (3 dp)

18. 0.6 x 0.5 = 0.30
60% will not be fine and 50% of these not fine days will have heavy rain.

Page 15

19. a) P(blood type O)

$= \frac{60}{200} = 0.30$

b) P(blood type A or B)

$= \frac{125}{200} = 0.625$

c) P(not AB) $= \frac{185}{200} = 0.925$

d) P(both O)

$= \frac{177}{1990} = 0.089$ (3 dp)

20. a) P(both miss) = 0.08

b) P(both hit) = 0.48

c) P(only one hits)
= (0.8 x 0.4) + (0.2 x 0.6)
= 0.44

d) P(hits only once)
= (0.8 x 0.2) + (0.2 x 0.8)
= 0.32

Page 15 cont...

21. a) P(both defective)

$= \frac{1}{300} = 0.003$ (3 dp)

b) P(both okay)

$= \frac{253}{300} = 0.843$ (3 dp)

c) P(one defective)

$= \frac{23}{150} = 0.153$ (3 dp)

22. a) P(all green)

$= \frac{1}{56} = 0.018$ (3 dp)

b) P(two red, third green)

$= \frac{1}{56} = 0.018$ (3 dp)

c) P(none are white)

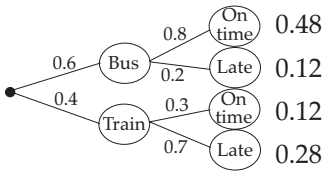
$= \frac{5}{28} = 0.179$ (3 dp)

d) P(only red is the last one)

$= \frac{5}{28} = 0.179$ (3 dp)

Page 17

23. a)



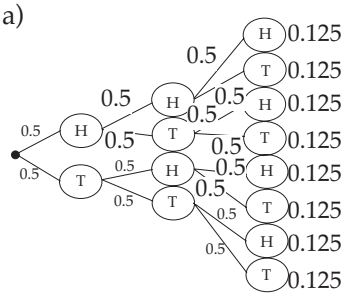
b) P(bus and late) = 0.12

c) P(train on time) = 0.12

d) P(on time bus or train)

= 0.6

24. a)



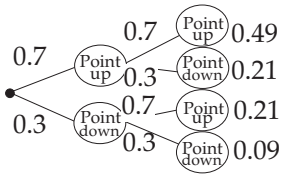
b) P(3H) = 0.125

c) P(2H1T) = 0.375

d) P(1H+) = 0.875

Page 17 cont...

25. a)



b) P(one pt. up) = 0.3

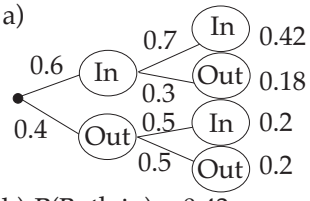
c) P(two pt. up) = 0.49

d) P(two pt. down) = 0.09

e) P(1 pt. up 1 pt dn.) = 0.42

f) 5 drawing pins

26. a)



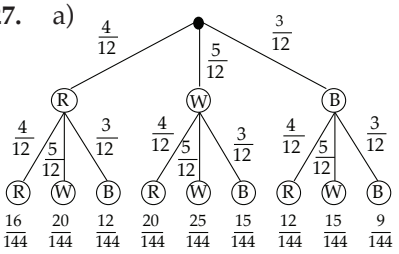
b) P(Both in) = 0.42

c) P(Both miss) = 0.2

d) P(1+ in) = 0.8

Page 18

27. a)



b) P(R and B) $= \frac{24}{144}\left(\frac{1}{6}\right)$

$= 0.167$

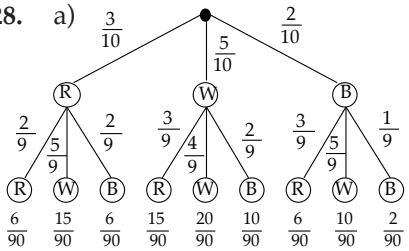
c) P(2 same)

$= \frac{16}{144} + \frac{25}{144} + \frac{9}{144}$

$= \frac{25}{72}$

$= 0.347$ (3 dp)

28. a)



b) P(R and B) $= \frac{12}{90}\left(\frac{2}{15}\right)$

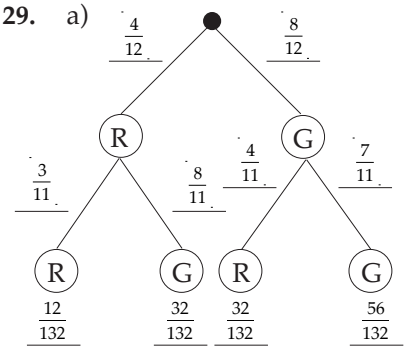
$= 0.133$ (3 dp)

Page 18 Q28 cont...

c) P(2 same)

$= \frac{28}{90}\left(\frac{14}{45}\right) = 0.311$ (3 dp)

29. a)



b) P(both green)

$= \frac{56}{132} = 0.424$ (3 dp)

c) P(RG or GR)

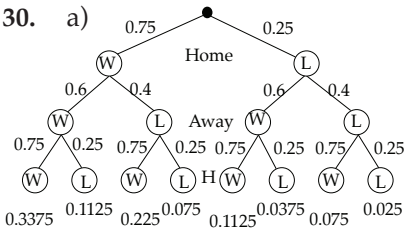
$= \frac{64}{132} = 0.485$ (3 dp)

d) P(sec. red given first red)

$= \frac{3}{11} = 0.273$ (3 dp)

Page 19

30. a)



b) P(win 3) = 0.3375

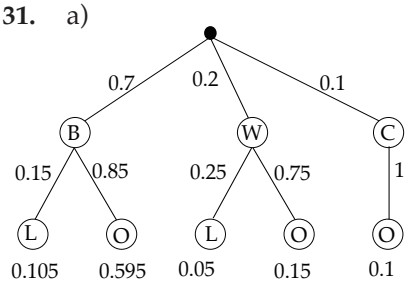
c) P(win 2) = 0.1125 + 0.225 + 0.1125

= 0.45

d) P(Home given 2 games)

$= \frac{0.225}{0.45} = 0.5$

31. a)



Page 19 Q31 cont...

b) P(late) $= 0.105 + 0.05$

$= 0.155$

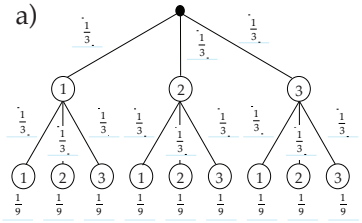
c) P(bike given late)

$= \frac{0.105}{0.155} = 0.677$

d) Days = 27.9

= 28 days

32. a)



b) P(sum even)

$= \frac{5}{9} = 0.556$ (3 dp)

c) P(sum ≥ 4)

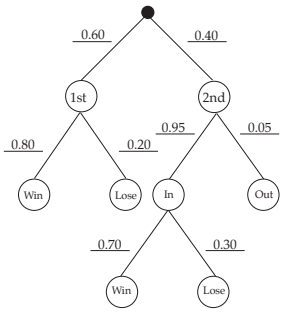
$= \frac{6}{9} = 0.667$ (3 dp)

d) P(sum even given first 1)

$= \frac{2}{3} = 0.667$ (3 dp)

Page 20

33. a)



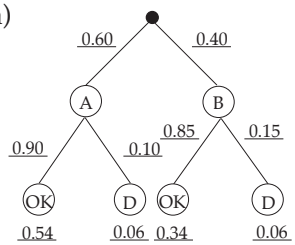
b) P(double faults) = 0.02

c) P(loses on first serve) = 0.12

d) P(wins point) = 0.746

e) P(given wins on 2nd serve) = 0.357 (3 dp).

34. a)



b) P(B and defective) = 0.06

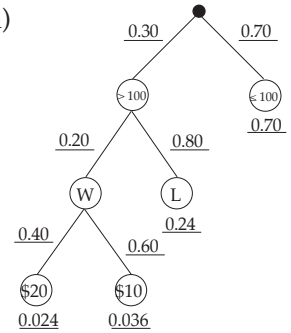
Page 20 Q34 cont...

c) P(defective) = 0.12

d) P(given defective prod. A) = 0.5

Page 21

35. a)

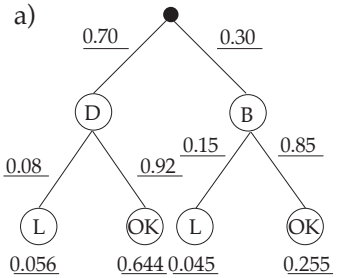


b) P(not win) = 0.94

c) P($20 voucher) = 0.024

d) P($10 vouch. given wins) = 0.036 ÷ 0.06 = 0.6

36. a)



b) P(bike and gets flat) = 0.045

c) P(late) = 0.101

d) P(car breaks down given late) = 0.056 ÷ 0.101 = 0.554

e) P(late two successive days) $= 0.101^2 = 0.010$ (3 dp)

Page 24

37. a) P(dying)

$= \frac{215}{605} = 0.355$ (3 dp)

b) P(< 50 dies)

$= \frac{180}{320} = 0.563$ (3 dp)

c) P(≥ 50 dies)

$= \frac{35}{285}$ 0.123 (3 dp)

d) RR $= \frac{\frac{180}{320}}{\frac{35}{285}} = 4.6$

e) A person under 50 who contracts the disease is 4.6 times more likely to die within one year of diagnosis.

Page 24 cont...

38. a) P(sex content)

$= \frac{150}{350} = 0.429$ (3 dp)

b) P(comedy contain sex)

$= \frac{70}{180} = 0.389$ (3 dp)

c) P(drama contain sex)

$= \frac{80}{170} = 0.471$ (3 dp)

d) RR $= \frac{\frac{70}{180}}{\frac{80}{170}} = 0.83$

e) A comedy show is 0.83 times less likely than a drama show to contain sexual content.

Page 25

39. a) Absolute risk = 0.0003

b) RR = 4

c) RR = 0.25

d) That the relative risk in Russia of birth deformities is four times greater if you are situated in a town near a nuclear facility.

40. a) Absolute risk = 0.125

b) RR = 0.9

c) RR = 1.1

d) That you are 1.1 times more likely to pass the course by tutoring than CAI. Assuming the figures calculated are unbiased, i.e. more brighter students may decide to study the course by tutoring.

41. a) Absolute risk = 0.2

b) RR = 1. No difference between the two factories.

c) RR = 1.5, i.e. 1.5 times more likely to have an accident in factory two than factory one.

Page 26

42. a) Absolute risk = 0.36

b) RR = 6.6

c) RR = 0.15

Page 26 Q42 cont...

d) RR = 4.1

e) RR = 0.24

f) An obese person is 6.6 times more likely to have diabetes than a person who is not obese. There appears to be causal link between obesity and diabetes.

43. RR = 9

44. a) Cycling

b) They have a fatality rate less than cycling.

c) 3.3 times

Page 27

45. a) i) $\frac{306}{435}$ (0.70)

ii) 7034 per 10 000

b) $\frac{180}{225}$ (0.8)

c) $\frac{126}{210}$ (0.6)

d) $\frac{0.6}{0.8}$ (0.75)

e) The risk of having an asthma attack for those taking the trialled drug is 0.75 times the risk of those taking the placebo.

f) $\frac{0.8}{0.6}$ (1.33 (3 sf))

g) The risk of having an asthma attack for those on the placebo is 1.3 times the risk of those taking the trialled drug.

h) Placebo. It is better to compare the risk of the drug group (treatment) with the placebo group (non-treatment).

i) $\frac{0.6-0.8}{0.8} \times 100\% = -25\%$

j) There is a 25% decrease in the chance of a patient having an asthma attack if they are taking the trialled drug compared to the placebo.

Page 31

Answer from tables (calculator Ans. in brackets).

46. a) 0.4554

b) 0.4222 + 0.4032 = 0.8254

Page 32 Q46 cont...

c) 0.5 – 0.4538 = 0.0462

d) 0.5 – 0.4268 = 0.0732 = (0.0733)

e) 0.5 + 0.2197 = 0.7197

f) 0.4505 – 0.4066 = 0.0439

47. a) 0.5 – 0.2190 = 0.2810

b) 0.4896 – 0.4525 = 0.0371 = (0.0370)

Page 33 Q47 cont...

c) 0.5 + 0.4694 = 0.9694 = (0.9693)

d) 0.4332 + 0.4332 = 0.8664

e) 0.5 + 0.2245 = 0.7245 = (0.7244)

f) 0.4756 + 0.1646 = 0.6402

48. a) 0.4500

b) 0.0500

c) 0.4276

d) 0.3530

e) 0.3149

f) 0.9483

Page 34 Q48 cont...

g) 0.2180

h) 0.4712

i) 0.8901 (0.8900)

j) 0.1806

Page 37

49. a) 0.4522

b) 0.0478

c) 0.3944

d) 0.2906 (0.2907)

e) 0.9522

50. a) 0.2412

b) 0.2247

c) 0.2016 (0.2017)

d) 0.5932 (0.5934)

e) 0.9559 (0.9560)

51. a) Z = 1.000

P(85 < X < 115) = 0.6826 (0.6827)

b) Z = 1.333 to Z = 2

P(120 < X < 130) = 0.0685

c) P = 0.0478. Expect 16 or 17.

d) P = 0.0310. Expect 10 or 11.

Page 38

52. a) p = 0.3545 (0.3546)

b) p = 0.0391 (0.0392)

c) p = 0.0391 (0.0392)

d) p = 0.8545 (0.8546)

e) p = 0.2752

53. a) p = 0.4136 (0.4137)

b) p = 0.0864 (0.0863)

c) p = 0.7932 (0.7934)

54. a) p = 0.0863

b) p = 0.3247

c) p = 0.3132

d) $p^2 = 0.0075$

e) p = 0.0363

f) $p^3 = 0.0342$

g) Expect 38 or 39.

Page 39 Tables ans. (Calc. ans.)

55. a) $P(X > 42\,000) = 0.0766$
$= (0.0766)$

b) $P(X < 27\,000) = 0.2377$
$= (0.2375)$

c) $P(25\,000 < X < 39\,000)$
$= 0.6826$
$= (0.6827)$

d) $P(X > 52\,000) = 0.0022$
$= (0.0021)$

Managers$= 0.0021 \times 800$
$= 1.71$
$= 2$ (rounding up)

Page 40 Tables ans. (Calc. ans.)

56. a) $P(X > 4.2) = 0.0228$

b) $P(X < 3.4) = 0.1151$

c) $P(3.8 < X < 4.5) = 0.3439$

d) $P(X < 3.0) = 0.0026$

Trees $= 0.0026 \times 2000$
$= 5.2$
$= 5$ (round down)

Page 41 Tables ans. (Calc. ans.)

57. a) $P(X < 30\,000) = 0.0433$
$= (0.0432)$

b) $P(X > 45\,000) = 0.334$
$= (0.3341)$

c) $P(X > 43\,800) = 0.4052$

Drives OK $= 0.3985 \times 150$
$= 59.78$
$= 60$ HDs
(rounding 0 dp)

d) $P(X < 30\,000) = 0.0433$

Two fail $= 0.0432 \times 0.0432$
$= 0.0019$ (4 dp)

Page 42 Tables ans. (Calc. ans.)

58. a) $P(X > 180) = 0.0303$
$= (0.0304)$

$= 3.0\%$

b) $P(X < 143) = 0.0030$

$= 0.3\ \%$

c) $P(150 < X < 160)$
$= 0.2357$
$= (0.2356)$

$= 23.6\ \%$

d) $P(X < 190) = 0.9991$

Two days $= 0.9991 \times 0.9991$
$= 0.9982$ (4 dp)

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59. a) $z = 0.579$

b) $z = 1.501$

c) $z = 1.137$

d) $z = 0.393$

e) $z = {}^{-}0.985$

60. a) $z = 1.01 \quad x = 79.2$

b) $z = 1.375 \quad x = 84.9$

c) $z = 0.78 \quad x = 75.6$

d) $z = 0.407 \quad x = 69.7$

Page 46 Q60 cont...

e) $z = {}^{-}0.444 \quad x = 56.5$

f) $z = {}^{-}0.892 \quad x = 49.5$

61. a) $z = {}^{-}1.716 \quad p = 0.0431\ (0.0430)$

b) $z = {}^{-}2.054 \quad x = 747.7$

c) Mean $= 763.8$

62. $\dfrac{x - 21.5}{2.4} = 0.385$
$x = 22.424$
mass $= 22.4$ kg

63. $\dfrac{x - 3}{0.75} = 1.645$
$x = 4.234$
time $= 4.23$ min.

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64. $\dfrac{x - 55}{12.5} = {}^{-}0.842$
$x = {}^{-}10.52 + 55$
$x = 44.48$
$x = 44.5\%$

65. a) $\dfrac{x - 55}{16} = 1.751$
$x = 83.016$
$x = 83\%$

b) $\dfrac{x - 55}{16} = 1.175$
$x = 73.8$
$x = 74\%$

Interval 74% to 83%

66. $\dfrac{x - 43.33}{13.25} = 1.645$
$x = 65.13$
$x = 65$ minutes 8 sec.

Page 47 cont...

67. a) $z = {}^{-}1.786$
$P(x < 200) = 0.037$
$= (0.037)$
Two less than 200 g
$P(x < 200)^2 = 0.037^2$
$= 0.0014$

b) $\dfrac{x - 207.5}{4.2} = {}^{-}2.327$
$x = 197.7$ g

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68. $\dfrac{5 - M}{0.150} = {}^{-}1.555$
$M = 5.23$ kg

69. a) $\dfrac{38 - 32}{\sigma} = 0.613$
$\sigma = 9.8$ wpm (1 dp)

b) $\dfrac{x - 32}{9.79} = {}^{-}0.674$
$x = 25.4$ wpm

c) $\dfrac{x_1 - 32}{9.79} = {}^{-}0.755$
$x_1 = 24.6$ wpm
$\dfrac{x_2 - 32}{9.79} = 0.755$
$x_2 = 39.4$ wpm

Interval 24.6 to 39.4

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70. a) First minute 22.5%

b) No. 85% of customers were served within 2 minutes.

c) A Normal distribution is a symmetrical bell shaped distribution about the mean. In the experiment there is a longer tail on the left of the mean and an unexpected peak in the 120+ class.
Expt. $P(X < 40) = 0.1375$
N.D. $P(X < 40) = 0.094$

71. a) 50 students

b) 78%

c) Mean = 90 seconds
$P(x < 90) = 0.68$

d) The distribution is not symmetrical. It is right skewed with a large group of students (9) taking over 150 seconds to complete the level.

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72. a) $P(x > 3) = 0.42$

b) No. It could be that there are balls with the number 5, but by chance none were selected.

c) The teacher's graph has the probability that a ball with 4 on it is 0.5 but in our experiment we only got 18 out of 50 which seems very low. The opposite occurs for the 2 ball. The teacher's graph says the probability is 0.075 but we selected 10 out of 50 which is a probability of 0.20. The teacher's graph is symmetrical while the experimental distribution is skewed to the left. It seems unlikely that the teacher's graph is correct.

73. a) 77 boys

b) 33.8%

c) The distribution of distances is almost symmetrical with a slight peak at over 70 m. The normal distribution would predict that for a throw over 50 m the probability would be 0.3938 which is close to the figure from the experiment.
In the experiment a random thrower had a 0.364 chance of throwing between 40 and 50 metres. The normal distribution predicts 0.298 for the same region. This normal distribution is similar to our experimental distribution.

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Practice External Assessment Task

Question One

a) i) $P(30 < X < 35) = P(^{-}1.25 < Z < 0.3125)$
$= 0.5172\ (0.5170)$ **A**

ii) $P(X < 40) = P(Z < 1.875)$
$= 0.9697\ (0.9696)$ **(A)**

Need the probability for two successive days of only being late once. Let L = Late
P(L and ≠L OR ≠L and L)
$= 0.0304 \times 0.9696 + 0.9696 \times 0.0304$
$= 0.0590$ **M**

iii) $\frac{x - 34}{3.2} = 1.645$ **(A)**
$x = 39.264$ **(M)**

Can't really leave any later as she has effectively only 44 seconds to spare otherwise she will be late 5% of the time. **E**

b) i) $\frac{30 - 31.1}{\sigma} = {}^{-}0.385$ **(A)**
$\sigma = 2.857$
$\sigma = 2.86$ (3 sf) **M**

Question One b) cont...

b) ii) The normal curve is symmetrical about 31 minutes while the histogram also has a mean of about 31 minutes but is skewed to the left (tail on left) with no results over 36 minutes while the normal curve exists beyond 36 minutes. The probability for both the histogram and the normal distribution having a result under 30 minutes is both 35%. The probability of a time over 34 minutes on the histogram is 5% but with the normal curve it is 15.5%. **E**

iii) $P(X < 28) = 0.125$
Over 240 days expect 30 days under 28 minutes. **A**

For Question One students require three of A for Achievement or two of M for Merit or one of E and one M for Excellence.

Question Two

a) $P(\text{R or Y and 6}) = (\frac{3}{6} \times \frac{1}{6}) + (\frac{1}{6} \times \frac{1}{6})$
$= \frac{1}{9} = 0.111$ (3 dp) **A**

b) $P(\text{no 6}) = \frac{85}{108}$

$\text{Cost (no 6)} = \frac{85}{108} \times 540 \times \$1$
$= \$425$

$P(\text{one 6}) = \frac{22}{108}$

$\text{Return (one 6)} = \frac{22}{108} \times 540 \times \$5$
$= \$550$

$P(\text{two 6}) = \frac{1}{108}$

$\text{Return (one 6)} = \frac{1}{108} \times 540 \times \$10$
$= \$50$

Nett $= \$175\ (550 + 50 - 425)$ **E**

Or **A for 1 probability, M for one return.**

c) $P(\text{G and 6}) = (\frac{2}{6} \times \frac{1}{6}) + (\frac{2}{6} \times \frac{5}{6} \times \frac{1}{6})$
$= \frac{11}{108}\ (0.1019)$ **A**

d) $P(\text{G} \mid 6) = \frac{P(\text{G and 6})}{P(6)}$

$P(\text{six}) = \frac{23}{108}$

$P(\text{G} \mid 6) = \frac{11}{23}$ **M**

Question Two cont...

e) $P(R, G, Y) = (\frac{3}{6} \times \frac{2}{6} \times \frac{1}{6}) \times 6$ **M**

$= \frac{1}{6}$

A for $(\frac{3}{6} \times \frac{2}{6} \times \frac{1}{6})$

f) P(green and 1st > 2nd)

$= (\frac{2}{6} \times \frac{15}{36})$

$= \frac{5}{36}$

P(other colour > 4)

$= (\frac{3}{6} \times \frac{1}{3}) + (\frac{1}{6} \times \frac{1}{3})$

$= \frac{2}{9}$

Don't agree as $\frac{2}{9} > \frac{5}{36}$. **E**

A for one probability M for both.

For Question Two students require three of A for Achievement or two of M for Merit or one of E and one M for Excellence.

Question Three

a) (i) $P(\text{risk F}) = \frac{200}{550}$

$= 0.364$ (3 dp) **A**

(ii) $P(F, Tut, P) = \frac{95}{160}$

$= 0.594$ (3 dp) **A**

b) $P(M, CAI, P) = \frac{84}{149}$

$= 0.564$ (3 dp) **M**

c) (i) $P(T, P) = \frac{160}{288}$

$= 0.556$ (3 dp) **M**

(ii) Risk/100 = 44.4 (44) **A**

(iii) Pass tutoring $= \frac{160}{288}$

Pass CAI $= \frac{190}{262}$

Relative risk $= \frac{190}{262} \div \frac{160}{288}$

$= 1.3$

So 1.3 times more likely to pass course by CAI than tutoring. **E**

(A) risk CAI or (M) relative risk.

Question Three c) cont...

(iv) Male pass with tutoring or CAI.

$P(M, P, Tut.) = \frac{65}{128}$

$P(M, P, CAI) = \frac{84}{110}$

Female pass with tutoring or CAI.

$P(F, P, Tut.) = \frac{95}{160}$

$P(F, \text{pass CAI}) = \frac{106}{152}$

Relative risk of females passing by tutoring compared to males.

Relative risk $= \frac{95}{160} \div \frac{65}{128}$

$= 1.2$

Females are 1.2 times more likely to pass by tutoring than males.

Relative risk of males passing by CAI compared to females.

Relative risk $= \frac{84}{110} \div \frac{106}{152}$

$= 1.1$

Males are 1.1 times more likely to pass by CAI than females. **E**

(A) probability calculation or (M) relative risk or E answer plus explanation.

For Question 3 students require three of A for Achievement or two of M for Merit or one of E and one M for Excellence.

Overall students require:

Two or more Achievement questions or better for overall Achievement.

Two or more Merit questions or better for overall Merit.

Two or more Excellent questions or better for overall Excellent.

NZQA External Examination

In the external examinations NZQA uses a different approach to marking based on understanding (u), relational thinking (r) and abstract thinking (t). They then allocate marks to these concepts (maximum of 8 for a question) and add them up to decide upon the overall grade. This approach is not as easy for students to self mark as the NuLake approach but the results should be broadly similar.