# **Revision answers: Statistics and probability (Topic 5)**

**Coursebook chapters: 21–24**

**1.** Use the midpoint to create a frequency table:

|  |  |
| --- | --- |
| **Midpoint** | **Frequency** |
| 9 | 26 |
| 14.5 | 18 |
| 19.5 | 45 |

From GDC: mean=15.4, S.D. = 4.54 *[4 marks]*

**2.** *X* ~ Po(18), P(*X* > 20) = 1 – P(*X* ≤ 20) = 0.269 *[4 marks]*

**3.** (a) , solving the equation gives *k* =.

(b)  *[6 marks]*

**4.** (a) P(walk) = 1 − P(rain or late) = 1 − (P(rain) + P(late) − P(rain and late))

As they are independent, P(rain and late) = 0.3 × 0.6 = 0.18, so P(walk) = 0.28

(b)  *[6 marks]*

**5.** *X* ~ N(0.3, 0.042)

(a) P(*X* > 0.36) × P(*X* > 0.36) = 0.00446

(b) 2 × P(*X* < 0.4) × P(*X* > 0.4) = 0.0123 *[6marks]*

**6. ** – 2*x* d*x* = 1 ⇒ 3*a*2 – 5*a* + 1 = 0 ⇒ *a* = 0.232 or 1.43

But 5 – 2*x* ≥ 0 for *a* ≤ *x* ≤ 2*a*, so *a* = 0.232. *[5 marks]*

**7.** (a) *X* ~ B(4, *p*), P(*X* = 3 or 4) = 4*p*3(1 – *p*) + *p*4 = 4*p*3 – 3*p*4

(b) 4*p*3 – 3*p*4 = 0.05 when *p* = 0.248 (using GDC) *[5 marks]*

**8.** (a) E(*X*) = 

(b) The possible ways of scoring three points out of four hands are (CHECK THE TABLE!):

|  |  |  |
| --- | --- | --- |
| **Distribution of points** | **Combinations** | **Probability** |
| 2, 1, 0, 0 | 4 × 3 = 12 | 1/72 |
| 1, 1, 1, 0 | 4 | 1/54 |

Out of those, only the ones in the first row contain a two-point hand, so:

*p* = *[7 marks]*

**9.** *X* ~ N (252, *σ*2), P(*X* ≥ 250) = 0.99 so P(*X* < 250) = 0.01

Standardising: = −2.32 ⇒  = 0.860 g *[5 marks]*

**10.** *V* ~ Po(3), P(*V* ≥ 5) = 1 – P(*V* ≤ 4) = 0.185

*S* ~ B(10, 0.7), P(*S* ≥ 8) = 1 – P(*S* ≤ 7) = 0.383

P(exactly one won) = 0.185 × (1 − 0.383) + 0.383 × (1 − 0.185) = 0.426

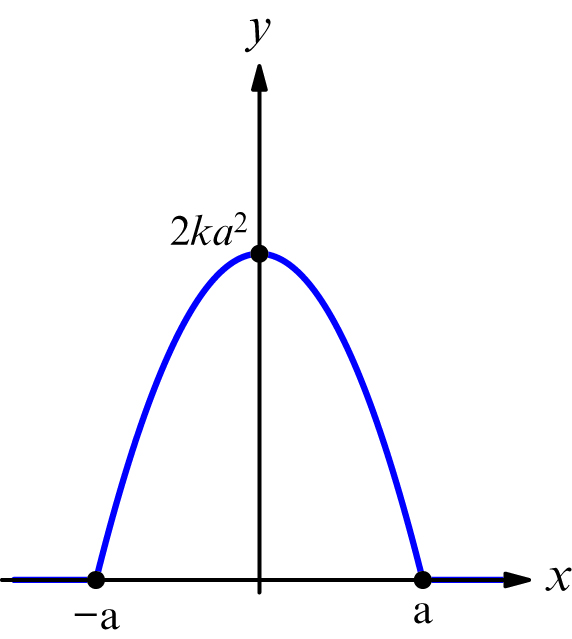
P(Vesna won) =  = 0.268 *[7 marks]*

**11.** *X* ~ N(50, 4), P(double-yolked) = 0.1 × P(*X* > 60) = 0.000210

*Y* ~ B(12, 0.000210), P(*Y* = 1) = 0.00740 *[5marks]*

**12.** (a) There are two possibilities: |*x*2 – *a*2| = *x*2 – *a*2 (when *x*2 ≥ *a*2) or |*x*2 – *a*2| = *a*2 – *x*2 (when *x*2 < *a*2). So:





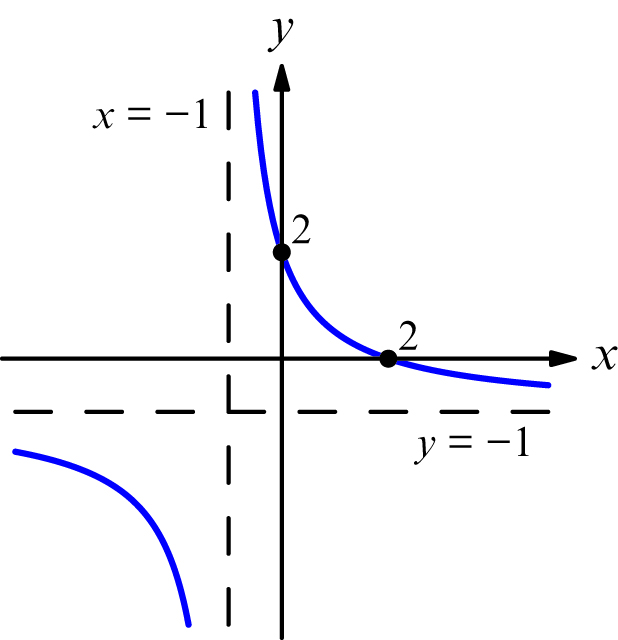
Note that you could sketch the graph on the GDC by using a particular value of *a*.

(b) [−*a*, *a*] (accept] −*a*, *a*[ as equally valid)

(c) (*a*2 – *x*2)d*x* = 1 ⇒ *k* =  *[8 marks]*

**13.** E(*ax*) = (*ap*)*x*(1 – *p*)*n* − *x* = (*ap* + 1 – *p*)*n* *[5 marks]*

**14.** (a)



(b) −1 < *a* < *b* ≤ 2, as pdf must be positive.

(c)  (or use GDC to sketch the integral with variable limits).

Solving gives *a* = 0.167, *b* = 1.967 *[8 marks]*