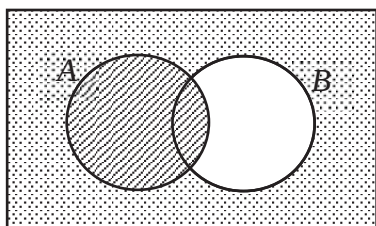


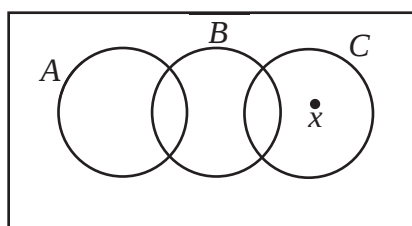
2020 Prelim Paper 1 Answers

1	0.0767	2	$3 \leq p < 5.5$
3	$(3q^2)/p^3$	4	$(2ab - 1)(3b + 1)$
5	$x = 1/3$ or -2	7	(a) 4.8 hrs (b) 9A
8	$p = \pm \sqrt{\frac{2n-m}{m+n}}$	9	$\frac{m}{n} = \frac{8}{9}$
10	(a) $B < A < C$ (b) $m + 3, s, r$	11	$\angle ABD = 57^\circ$, hence $\angle ABD \neq \angle CBD$. These angles are alternate angles between lines AB and DC. Therefore AB is not parallel to DC.
12	\$4500	13	(a) 4 : 2 : 3 (b) $c = 14, v = 2, t = 13$
14	567 cm ²	15	(a) $(x^2 + 2y)(x^2 - 2y)$ (b) $(x^2 + 4x - 2)(x^2 - 4x - 2)$
17	$X = 168^\circ$	18	195 cm ²
19	(a) 10.8 sec (b) 77.8% (c) 3, 4 or 5	20	IQ = 0.776 (3sf)
21	(a) $2^2 \times 3^3 \times 7$ (b) $N = 126$ (c) $10 + 8 - 2 = 16$	22	(a) 283° (exact) (b) 132.0° (1 dp)
23	(a) 55° (b) 110°		
24	(a) least value = -2.4 (b) Draw $y = -4$, the line $y = -4$ does not intersect the curve, hence the given equation has no solution. (ci) $x^3 + 2x^2 - 16x + 5 = 0$ (cii) $x = 0.35$ or 2.9		
25	(a) $5y = -7x + 35$ (b) 4.63 units ² (3sf) (c) $p = 3$		

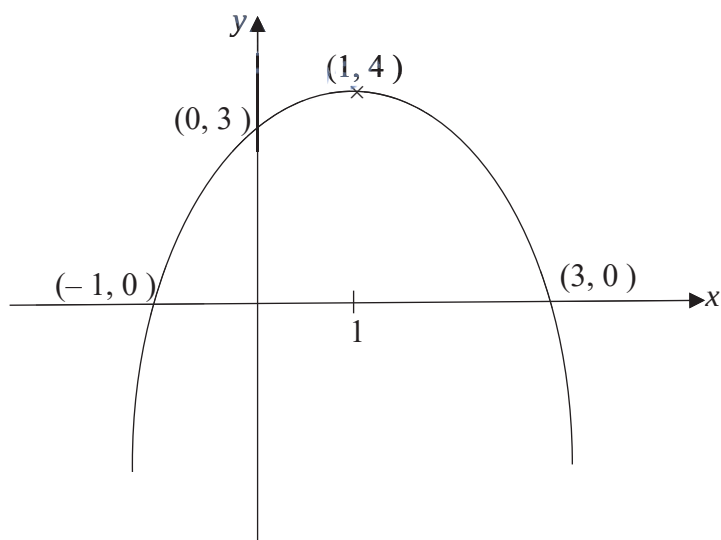
6 (a)



(b)



16



[Turn over

2020 Prelim Paper 2 Answers

1	(a) $\frac{8}{3a}$ (b) $\frac{-(5+2y)}{y+1}$ (c) $\frac{9x+1}{2(3x-1)^2}$ (d) $x = 1$ or -6
2	(a)(i) 2499 children (ii) 6325 adults (b)(i) 1.70×10^3 (ii) 3.41 days (c) \$15 141.71
3	(a) $\begin{pmatrix} 10 & 20 \\ 20 & 12 \\ 18 & 10 \end{pmatrix}$ (b) $\begin{pmatrix} 291 & 7 \\ 296.4 & 0 \\ 258.6 & -0.4 \end{pmatrix}$ (c) 7 represents that Jen will pay \$7 more in shop B than in shop A. 0 represents that Kate will pay in same amount in either shop. -0.4 represents that Lin will pay 40cents less in shop B than in shop A. (d)(i) \$98.80 (ii) $\\$ \frac{1291x}{5(100+x)}$ (iii) $x = 62.0$ (3sf)
4	(a) $T_5 = 7^2 + 11 = 60$ (b)(i) $T_n = (n+5)(n+1)$ (ii) 13, 17 (c)(i) $T_{n-1} = n(n+4)$ (ii) Difference = $T_n - T_{n-1} = 2n + 5$, For all values of n, $2n$ is always even. Sum of even and odd is always odd. Hence $2n + 5$ is always odd.
5	(a)(i) $\angle ABD = 305^\circ$, perpendicular of BC (ii) 253° (b) $\angle$ bisector of $\angle BCD$, arc centre A radius 6 cm, shaded region enclosed by $\angle$ bisector, arc and side AB. (c)(i) 0.5 m/s (c)(ii) Peter: (1205, 300) to (1208, 180) to (1210, 180) to (1212, 150) to (1217, 0) (iii) 1205
6	(a) $\frac{30}{x}$ (b) $\frac{30}{x+50}$ (c) $\frac{30}{x} - \frac{30}{x+50} = 25(\text{litres})$ (d) 1.173 or -51.173 (d) Find the time taken for the tank to be completely emptied. Time taken = 21 hr 19.3125 mins = 21 hr 20 min (to nearest min)
7(a)	(ai) $\angle ABC = 90^\circ$ ($\angle$ in semicircle) $\angle DBE = 180 - 90 = 90^\circ$ (adj $\angle$s on str line) By “$\angle$ in a semicircle is a right $\angle$,” DE is the diameter of circle II (aii) $\angle ABC = \angle DBE = 90^\circ$ (shown) $AC = DE$ (diameter of $\equiv$ circles) $BC = BE$ (given) $\triangle ABC \equiv \triangle DBE$ (RHS)
7	(b)(i) $-5/13$ (ii) 11.2 cm (3sf) (c) 36.4 cm^2
8	(a) $p = 3$ (c) 49 cm (d) 3.72 m (2dp) [3.65 – 3.75] 0.342 sec (3dp) [0.330 – 0.350] (e) $0.125 < t < 0.556$ [0.115 – 0.135] [0.545 – 0.560] (f)(i) Grad = -8.70 m/s (ii) The rate at which the height of the jet of water is decreasing at $t = 0.5$ sec is 8.70 m/s.
9(a)	(a)(i) 25.4 min (ii) 12.1 min (b) (b)(i)(a) 26.8 min [26.5 – 26.9] (b) $35 - 18 = 17$ min (b)(ii) 96 unhappy people (c) (ci) Median time taken = 26.8 min. On average voters in Y took 26.8 mins to vote. Hence the estimate was met. (cii) The statement is correct. SD of $X = 12.1$ min, IQR of $Y = 17$ mins. The times taken in X have a smaller spread and are more consistent.
9(d)	(i) $\frac{19}{120}$ (ii) $\frac{437}{1912}$ (iii) $\frac{667}{1912}$
10	(b) Total SA of closed cylinder = 395.84 cm^2 Total SA of Δ box = 416.82 cm^2. Mr Tan should adopt the closed cylinder design. The closed cylinder has a smaller total SA and hence - Needs less material to manufacture - Is more environmentally friendly - Is cheaper

