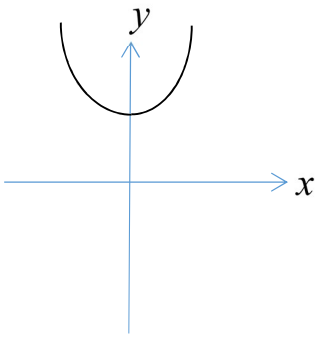
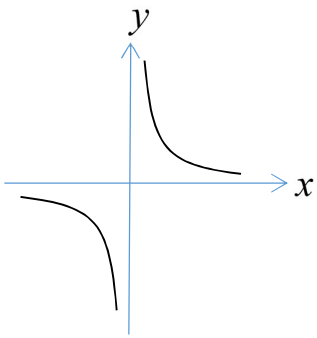
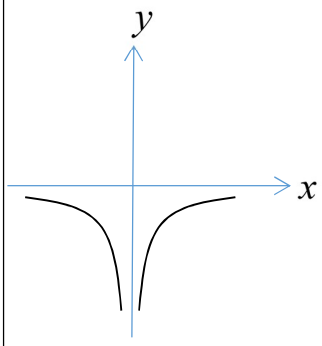
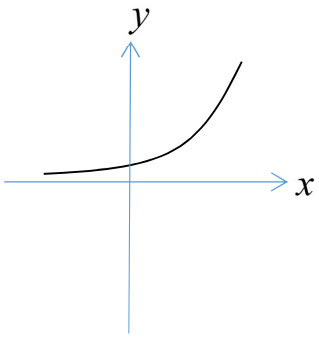
2020 EYE 4NA MA4045 P1 Marking Scheme

1a	3.45 Accept also 3.451612903, $3\frac{14}{31}$	B1
1b	6.55	B1
2a	25	B1
2b	23	B1
3	Small size $150\,ml$ – \$7.50 $10\,ml$ – \$0.50 Large size $200\,ml$ – \$10.20 $10\,ml$ – \$0.51 The **small** size provides better value as it costs **\$0.50 per 10 ml**.	A1(working to justify answer) B1
4a	$T_n = 5 - 2(n-1)$ $T_n = 7 - 2n$	B1
4b	$7 - 2p = -27$ $2p = 34$ $p = 17$	M1 A1
5	104% – \$4160 100% – \$4000	M1 A1
6a	$2^{12} = 16^a$ $2^{12} = 2^{4a}$ $12 = 4a$ $a = 3$	 B1
6b	$\frac{7p^5}{q^3} \div \frac{14}{q^2}$ $= \frac{7p^5}{q^3} \times \frac{q^2}{14}$ $= \frac{p^5}{2q}$	 B1
7	Time = 34 min Distance	

	$= 24 \times \frac{34}{60}$ $= 13.6 \quad km$	M1 for finding distance A1
8	$y = \frac{k}{x}$ When $x = 4$, $y = 2$ $2 = \frac{k}{4}$ $k = 8$ $y = \frac{8}{x}$ When $x = 1/2$, $y = \frac{8}{1/2}$ $y = 16$	M1 A1
9a	$7 \times 300000 \quad M1$ $= 2100000 \ cm$ $= 21 \ km \quad A1$ or $1\,cm \ - \ 300000 \ cm$ $= 3\,km \quad M1$ $7\,cm \ - \ 7 \times 3\,km$ $= 21 km \quad A1$	M1 A1
9b	$1\,cm^2 \ - \ 9 \ km^2$ $2\,cm^2 \ - \ 18 \ km^2$ Area of lake is 2 cm^2.	M1 A1
10a	$64a^2 - 49$ $= (8a)^2 - (7)^2$ $= (8a + 7)(8a - 7)$	B1
10b	$5my - 10m + ny - 2n$ $= 5m(y - 2) + n(y - 2)$ $= (y - 2)(5m + n)$	M1 A1
11a	P(ball is red)	

	$= \frac{10}{25}$ $= \frac{2}{5}$	B1
11b	P(ball is not green) $= \frac{18}{25}$	B1
11c	P(ball is black) = 0	B1
12a	Surface area $= \pi(5)(12) + \pi(5)^2$ $= 85\pi$	M1 A1
12b	$h^2 + 5^2 = 12^2$ $h = 10.9$	B1
13	Sum of interior angles $= (6-2) \times 180°$ $= 720°$ $160 + 2x - 120 + x - 10 + x + 40 + 100 + x = 720$ $5x = 550$ $x = 110$	M1 M1 A1
14a	$\frac{1}{2} \times 50 \times v = 100$ $v = 4$	M1 A1
14b	Deceleration $= \frac{4-0}{50-20}$ $= \frac{2}{15}$	M1 A1
14c	Speed at 12 s is $= \frac{4}{20} \times 12$ $= 2.4$ Distance $= \frac{1}{2} \times 2.4 \times 12$ $= 14.4$	 M1 A1

15	Area of sector $= \frac{150°}{360°} \times \pi(6)^2$ $= 15\pi \ cm^2$ Area of triangle $= \frac{1}{2} \times 6^2 \times \sin 150°$ $= 9 \ cm^2$ Area of shaded area $= \ 15\pi - 9 \ \ cm^2$	M1 for area of sector M1 for area of triangle A1
16a	The total number of students in Nora's class and Eunice's class are different so it is not accurate to compare using the size of each sector.	B1
16b	$135° \ - \ 9$ $1° \ - \ \frac{9}{135}$ $360° \ - \ \frac{9}{135} \times 360 \ = \ 24$	M1 A1
17a	$x = 180 - 128$ (interior angles, parallel lines) $= 52$	B1
17b	$44 + y = 128$ (exterior angle of triangle) $y = 84$	B1
18a	$-6 < 2x \le 8$ $-3 < x \le 4$ Possible values of x are -2, -1, 0, 1, 2, 3 and 4	M1 A1
18b	$-7x \ge 26$ $x \le \frac{26}{-7}$ $x \le -3\frac{5}{7}$	B1

19	 $E \quad y = x^2 + 1 \quad B1$  $A \quad y = \frac{1}{x} \quad B1$  $C \quad y = \frac{-2}{x^2} \quad B1$  $D \quad y = 2^x \quad B1$	B1 B1 B1 B1 for each graph
20a	$\frac{1}{16} = 6.25\%$	B1
20b	median $= \frac{162 + 163}{2}$ $= 162.5$	B1
21a	$x^2 - 8x + 21$ $= x^2 - 8x + \left(\frac{-8}{2}\right)^2 - \left(\frac{-8}{2}\right)^2 + 21$ $= (x-4)^2 + 5$ $\therefore p = -4, q = 5$	M1, A1 or B1, B1

21b	$x^2 - 8x + 21 = 9$ $(x-4)^2 + 5 = 9$ $(x-4)^2 = 4$ $x - 4 = \pm\sqrt{4}$ $x = 2 + 4 \; or \; -2 + 4$ $x = 6 \quad or \quad 2$	B1, B1
22a	Total interest after 4 years $= \frac{(700)(2.2)(4)}{100}$ $M1$ $= \$61.60$ $A1$	M1 A1
22b	Amount $= 700\left(1 + \frac{2.1}{100}\right)^4$ $M1$ $= \$760.68$ Interest $= \$60.68$ $M1$ Mr Tan will earn more as his earned interest is higher. B1	M1 M1 B1
23a	$x = \frac{5 - k^2}{2y}$ $2xy = 5 - k^2$ $k^2 = 5 - 2xy$ $M1$ $k = \pm\sqrt{5 - 2xy}$ $A1$	 M1 A1

23b	$4x + y = -1 \ ---(1)$ $3x - 4y = 23 \ ---(2)$ $y = -4x - 1 \ ---(3)$ *Sub* (3) *in* (2) : $3x - 4(-1 - 4x) = 23$ $M1$ $3x + 4 + 16x = 23$ $19x = 19$ $x = 1$ *Sub* $x = 1$ *in* (3) : $y = -1 - 4$ $y = -5$ $\therefore x = 1, y = -5$ $A1, A1$	M1 A1, A1
24a	x-coordinates of D = x-coordinates of C = 7 Length of BA = 4 = length of CD y-coordinates of D = 10 – 4 =6 D is (7, 6)	B1
24b(i)	$x = 2$	B1
24b(ii)	gradient of BC $= \frac{10-5}{7-2}$ $= 1$ $M1$ Equation of line $y = x + c$ Substitue (7,10) into equation $10 = 7 + c$ $c = 3$ $M1$ $y = x + 3$ $A1$	M1 M1 A1
25a	$\sin \angle ADC = \frac{5}{13}$ $\angle ADC = 22.6°$	M1 A1

25b	$\cos \angle ADE$ $= -\frac{12}{13}$	B1
25c	$\frac{1}{2}x(5)(\sin 30°) = 45$ $\frac{5}{4}x = 45$ $x = 36$	M1 A1