



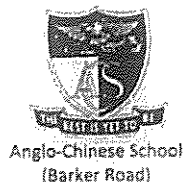
Marking Scheme
Secondary 3 End-Of-Year Examination
SEC 3Express 2021 P2

1	<p>(a)</p> $\frac{3}{2x-5} - \frac{1}{5+x}$ $= \frac{3(5+x) - 1(2x-5)}{(2x-5)(5+x)}$ $= \frac{20+x}{(2x-5)(5+x)}$ <p>(b)</p> $= \frac{5a^2b^2c}{2a^3} \times \frac{-9c}{8b^3}$ $= \frac{-45c^2}{16ab}$ <p>(c)(i)</p> $\frac{9}{11}$ <p>(ii)</p> $A = \frac{3}{2} \left(\frac{p^2 - q^2}{r} \right)$ $\frac{2Ar}{3} = p^2 - q^2$ $q^2 = p^2 - \frac{2Ar}{3}$ $q = \pm \sqrt{p^2 - \frac{2Ar}{3}}$			
2	<p>(a)(i)</p> $\frac{737}{27}$ $= 27.296$ $= 27.3(3sf)$ <p>(ii)</p> <p>28</p> <p>(iii)</p> <p>32</p> <p>(b)</p> $\frac{11}{27} \times 100\%$ $= 40.7\%(3sf)$ <p>(c)</p> <p>Mathematics because the median mark is 28 marks which is higher than the median mark for Science weighted assessment which is 26 marks. (or comparison of mean: Math (27.3) Science (26.1)).</p>			



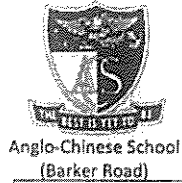
Marking Scheme
Secondary 3 End-Of-Year Examination
SEC 3Express 2021 P2

	(d)	$\frac{11}{27}$			
	(e)	The mean will increase by 2 marks. Range will remain the same.			
3	(a)	Slanted height of cone = 5 cm Total surface area $= \pi(3)^2 + 2\pi(3)(4) + \pi(3)(5)$ $= 48\pi$ Surface area in contact with water $= 48\pi \div 2$ $= 24\pi \text{ cm}^2$	To get slanted height of cone By Pythagoras' Theorem Slanted height = $\sqrt{3^2 + 4^2}$ $= \sqrt{25}$ $= 5 \text{ cm}$		
	(b)	Volume of cylinder = $\pi(3)^2(4) = 36\pi$ Volume of cone = $\frac{1}{3}\pi(3)^2(4) = 12\pi$ Volume of water = $\frac{1}{2}(36\pi + 12\pi) = 24\pi$ (shown)			
	(c)	Volume of water in cylinder $= 24\pi - 12\pi = 12\pi$ Height of water in cylinder $= 12\pi \div \pi(3)^2 = \frac{4}{3} \text{ cm}$ Depth of the water $= \frac{4}{3} + 4 = 5.33 \text{ cm}$ OR Ratio of volume of cylinder: cone = 3:1 Volume of container $\rightarrow 4$ units Volume of water $\rightarrow 2$ units Volume of water in container $\rightarrow 1$ unit Height of water in cylinder = $\frac{1}{3} \times 4 \text{ cm}$			



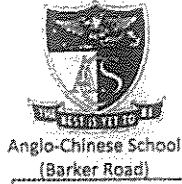
Marking Scheme
Secondary 3 End-Of-Year Examination
SEC 3Express 2021 P2

		Depth of the water $= \frac{4}{3} + 4 = 5.33 \text{ cm}$			
4	(a)(i)	$\angle ADC = 90^\circ$ (tangent \perp radius) $\angle ACD = 180^\circ - 90^\circ - 45^\circ$ (\angle sum of Δ) $= 45^\circ$			
	(ii)	$\angle BED = 180^\circ - 45^\circ = 135^\circ$ (\angle s in opp. segments) $\angle EBD = \frac{180^\circ - 135^\circ}{2}$ (base \angle s of isos. Δ) $= 22.5^\circ$			
	(iii)	Reflex $\angle BOD = 2 \times 135^\circ$ (\angle at centre = $2 \times \angle$ at circumference) $= 270^\circ$			
	(iv)	$\angle DAC = \angle OAB$ (given) $\angle AOB = \angle ADC$ (corr \angle s, $OB \parallel DC$) AOB is similar to ADC (AA similarity test)			
	(b)(i)	$AB = CF$ and $BF = FE$			
		Let $\angle FBC = \angle BFC = x$ (isosceles triangle) $\angle ABF = \angle CFE = 180^\circ - x$ (adj. \angle on a st. line)			
		$\Delta ABF \cong \Delta CFE$ (SAS)			
	(ii)	Because $\Delta ABF \cong \Delta CFE$, $\angle AFB = \angle CEF$ $\angle AFB = \angle EFD$ (vertically opposite angles) $\therefore \angle DEF = \angle EFD$, DEF is an isosceles triangle.			
5	(a)	$\frac{2000}{x}$			
	(b)	$\frac{2000}{x+0.12}$ or $\frac{50000}{25x+3}$ or $\frac{200000}{100x+12}$			
	(c)				



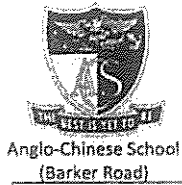
Marking Scheme
Secondary 3 End-Of-Year Examination
SEC 3Express 2021 P2

	(d)	$\frac{2000}{x} - \frac{2000}{x+0.12} = 200$ $2000(x+0.12) - 2000x = 200x(x+0.12)$ $200x^2 + 24x - 240 = 0$ $25x^2 + 3x - 30 = 0 \text{ (shown)}$ <p>By quadratic formula,</p> $x = \frac{-3 \pm \sqrt{(3)^2 - 4(25)(-30)}}{2(25)}$ $x = 1.0370 \text{ or } -1.15708$ $= 1.037 \text{ or } -1.157(3dp)$			
	(e)	$\frac{2000}{1.037} + \frac{2000}{1.037+0.12}$ $= 3657.248$ $= 3657.25(2dp)$			
6	(a)	$\angle BCA = 205^\circ - 180^\circ = 25^\circ$ $AB^2 = 180^2 + 250^2 - 2(180)(250)\cos 25^\circ$ $AB = \sqrt{13332.29917}$ $= 115.466 \text{ m (6 s.f.)}$ $= 115 \text{ m (3 s.f.)}$			
	(b)	$\frac{\sin \angle ABC}{250} = \frac{\sin 25^\circ}{115.466}$			
	Since $\angle ABC$	$\sin \angle ABC = \frac{\sin 25^\circ}{115.466} \times 250 = 66.2096$			
	Given is obtuse	$\angle ABC = 180 - 66.210^\circ = 113.79^\circ \text{ (2 d.p.)}$			
		OR			
		$\frac{\sin \angle BAC}{180} = \frac{\sin 25^\circ}{115.466} = 41.2099$ $\angle ABC = 180 - 25 - 41.2099 = 113.8^\circ \text{ or simply find}$ $\text{Bearing} = 180 - 41.2099 = 138.7901$			
		OR			
		$\cos \angle ABC = \frac{180^2 + 115.466^2 - 250^2}{2(180)(115.466)}$ $\angle ABC = 113.789$			
		Bearing of A from B			
		$= 25^\circ + 113.79^\circ$ $= 138.8^\circ \text{ (1 d.p.)}$			



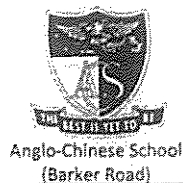
Marking Scheme
Secondary 3 End-Of-Year Examination
SEC 3Express 2021 P2

(c)	Let BX be the shortest distance from B to AC .			
	$\cos 25^\circ = \frac{CX}{180}$			
	$CX = 180 \times \cos 25^\circ$			
	$= 163.135 \text{ m}$			
	Distance travelled			
	$= 250 - 163.135$			
	$= 86.865 \text{ m (5 s.f.)}$			
	$= 86.9 \text{ m (3sf)}$			
	OR			
	$\cos 41.2099^\circ = \frac{AX}{115.466}$			
	$AX = 86.9 \text{ m}$			
(d)	$\sin 25^\circ = \frac{Bx}{180}$ $Bx = 180 \sin 25^\circ$			
Let θ be the max. \angle of elevation.	$\tan \theta = \frac{10}{76.0713} = 76.0713$			
	$\theta = 7.4889$			
	$= 7.5^\circ (1dp)$			
7 (a) (b) (Refer to graph attached for clarity)				
(c)	$y = 1$ drawn $x = 1.25$ or 4.75	$\frac{x}{3} + \frac{2}{x} = 2$ $\frac{x}{3} + \frac{2}{x} - 1 = 2 - 1$	$y = \frac{x}{3} + \frac{2}{x} - 1$ $y = 1$	
(d)	Tangent of gradient -2.5 drawn $x = 0.85$		$\frac{x}{3} + \frac{2}{x} - 1 = 1$ * Find points of intersection of $y = \frac{x}{3} + \frac{2}{x} - 1$ & $y = 1$	



Marking Scheme
Secondary 3 End-Of-Year Examination
SEC 3Express 2021 P2

<p>(e)(i)</p> <p>(ii)</p>	<p>$y+x=5$ drawn $x=0.35$ or 4.15</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> </tr> <tr> <td>y</td> <td>5</td> <td>4</td> <td>3</td> </tr> </table> <p>$5-x = \frac{x}{3} + \frac{2}{x} - 1$ (Multiply by $3x$) $15x - 3x^2 = x^2 + 6x - 3x$ $-3x^2 - x^2 + 15x + 3x - 6 = 0$ $-4x^2 + 18x - 6 = 0$ $2x^2 - 9x + 3 = 0$</p> <p>$\therefore A=2$ $B=9$</p>	x	0	1	2	y	5	4	3							
x	0	1	2													
y	5	4	3													
<p>8 (a)</p> <p>(b)</p> <p>(c)</p>	<p>$12000\left(1 + \frac{r}{100}\right)^3 = 13267$</p> <p>$\left(1 + \frac{r}{100}\right)^3 = \frac{13267}{12000}$</p> <p>$1 + \frac{r}{100} = \sqrt[3]{\frac{13267}{12000}}$</p> <p>$r = 3.4023$ $r = 3.40(3sf)$</p> <p>$\frac{5}{100} \times 3500 = 175$</p> <p>$\frac{107}{100} \times 175$ $= 187.25$</p> <p>Total Costs incurred by Amelia</p> <table border="1" style="width: 100%;"> <tbody> <tr> <td>Production Cost of the product</td> <td>\$99 per set</td> <td>$99 \times 90 = 8910$</td> </tr> <tr> <td>Parcel Packaging Cost</td> <td>\$3.50 per set</td> <td>$3.50 \times 90 = 315$</td> </tr> <tr> <td>Shipping Fee to buyer</td> <td>\$1.41 per set</td> <td>$1.41 \times 90 = 126.90$</td> </tr> <tr> <td>Advertising Fees on ShopNow</td> <td>\$16 per day</td> <td>$16 \times 30 = 480$</td> </tr> </tbody> </table>	Production Cost of the product	\$99 per set	$99 \times 90 = 8910$	Parcel Packaging Cost	\$3.50 per set	$3.50 \times 90 = 315$	Shipping Fee to buyer	\$1.41 per set	$1.41 \times 90 = 126.90$	Advertising Fees on ShopNow	\$16 per day	$16 \times 30 = 480$			
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SEC 3Express 2021 P2

	Additional Fees charged by ShopNow	\$392.10 per month	392.10		
	Office Rental Cost inclusive of utilities	\$600 per month	600		
	Total cost per product		\$10824		
	<p>If she earns 30% profit, 1.3×10824 $= 14071.20$ Suggested Price per set $= \frac{14071.20}{90}$ $= \\$156.35(2dp)$</p> <p>If she earns 20% profit, 1.2×10824 $= 12988.80$ Suggested Price per set $= \frac{12988.80}{90}$ $= \\$144.32(2dp)$</p> <p>Amelia should price the product at \$145 as it is cheaper than what the other online seller is charging at \$150.</p> <p>OR</p> <p>Amelia should price the product at \$156.35 so that she can earn the highest percentage of profit from her sales. (This answer is acceptable as the advertising fees is significant in real context to channel more visitor traffic to buy the product from her or it could be a case whereby the other online seller may run out of stocks or her regular</p>				

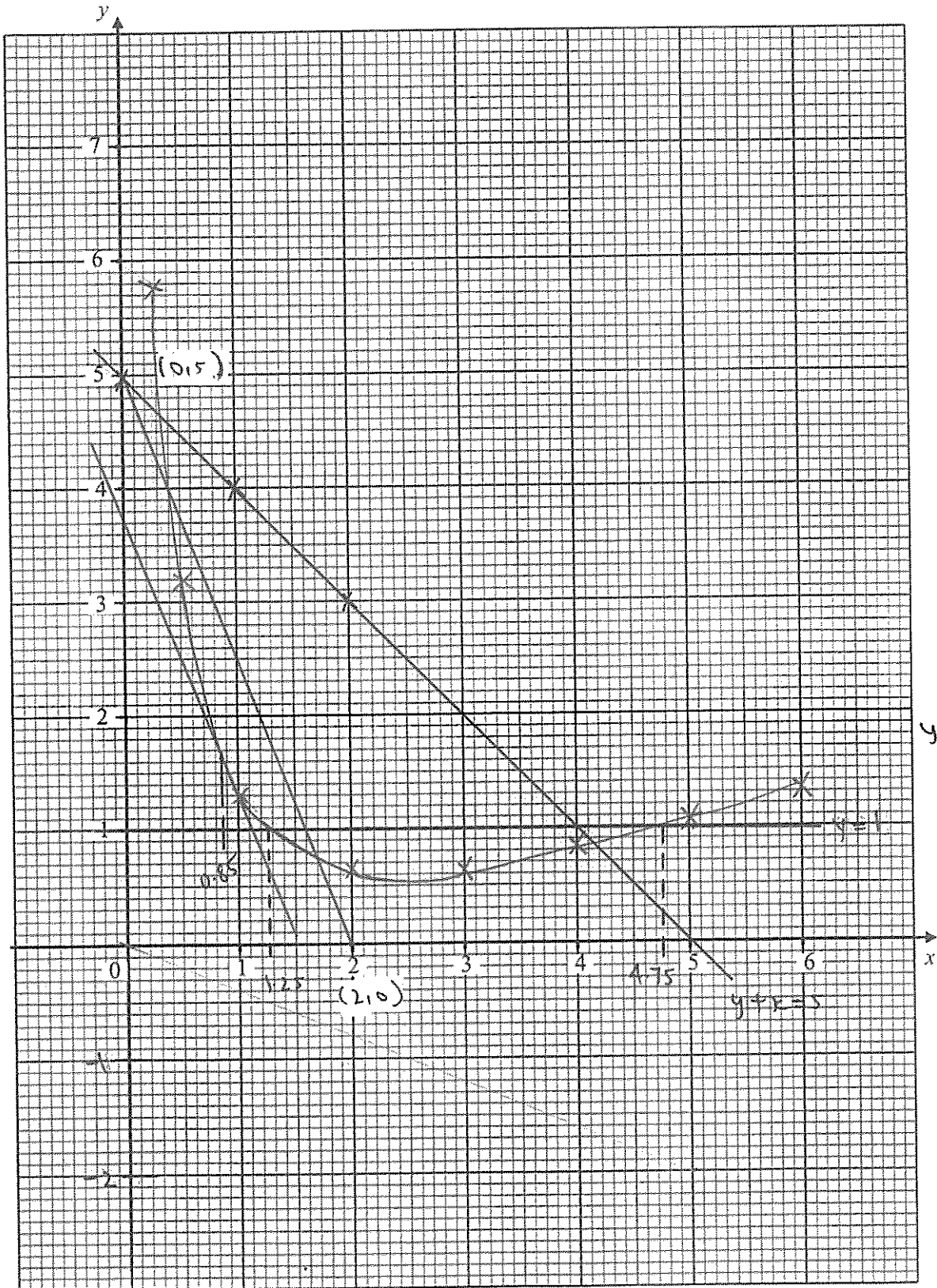


Anglo-Chinese School
(Barker Road)

Marking Scheme
Secondary 3 End-Of-Year Examination
SEC 3Express 2021 P2

	<p>customers do not mind paying more for her good service)</p> <p>OR</p> <p>Amelia should price the product at \$150 similar to what the other online seller is charging since they are the only two sellers online.</p>			
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Qns 7(b) Paper 2.



$$y = \frac{x}{3} + \frac{2}{x} - 1$$

(d) To draw line of gradient $= -2.5$,
 draw a line with coordinates
 $(0, 5)$ and $(2, 0)$

$$\text{Gradient} = \frac{0-5}{2-0} = -\frac{5}{2} = -2.5$$

17 * Shift this line
 down to draw tangent
 to curve.

$$\therefore x = 0.85$$