National 5 Maths
SQA 2022 Paper 2
Full Solutions

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1. $(3x-2)(2x^2+5x-1) = 3x(2x^2+5x-1) - 2(2x^2+5x-1)$

$= 6x^3 + 15x^2 - 3x - 4x^2 - 10x + 2$

$= 6x^3 + 11x^2 - 13x + 2$

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2. $215\,000 \times 1.03^4 = £241\,984.39$

$\approx £242\,000$

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3. Volume of sphere $= \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \pi \times 0.2^3$

$= 0.033510 \ldots \text{m}^3$

Volume of cuboid $= lbh$

$= 0.48 \times 0.48 \times 2$

$= 0.4608\ \text{m}^3$

Total volume $= 0.0335 + 0.4608$

$\approx 0.494\ \text{m}^3$

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4. (a) Using m for the cost of a mango and a for the cost of an apple:

$4m + 3a = 4.25$ ①

(b) $5m + 2a = 4.7$ ②

(c) $8m + 6a = 8.5$ ①×2 → ③

$15m + 6a = 14.1$ ②×3 → ④

4. (c) **Continued.**

$7m = 5.6 \quad ④ - ③$

$m = 0.8$

Substitute into ①:

$4(0.8) + 3a = 4.25$

$3.2 + 3a = 4.25$

$3a = 4.25 - 3.2$

$3a = 1.05$

$a = 0.35$

One mango costs 80p. One apple costs 35p.

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5. (a) Mean $\bar{x} = \frac{29+27+24+31+22+19+30}{7} = \frac{182}{7} = 26$

x	$x - \bar{x}$	$(x - \bar{x})^2$
29	3	9
27	1	1
24	–2	4
31	5	25
22	–4	16
19	–7	49
30	4	16
Totals:	**0**	**120**

Standard deviation = $\sqrt{\frac{120}{7-1}} = \sqrt{20} \approx 4.47$

(b) On average, the hockey team recorded a higher number of sit-ups.
The hockey team's number of sit-ups was more consistent.

(or equivalent statements)

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6. Area $= \frac{1}{2}\, a\, b \sin C$

$= \frac{1}{2} \times 25 \times 32 \times \sin 58°$

$\approx 339.2 \text{ cm}^2$

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7. $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$= \frac{-2 \pm \sqrt{4 - 4 \times 4 \times -7}}{8}$

$= \frac{-2 \pm \sqrt{4 + 112}}{8}$

$= \frac{-2 \pm \sqrt{116}}{8}$

≈ -1.6 or 1.1 (rounded to 2 s.f.)

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8. Using a for the distance from O to the midpoint of AB:

$a^2 = 2.9^2 - 2^2$

$= 8.41 - 4$

$= 4.41$

$a = \sqrt{4.41}$

$= 2.1$

Height $= 2.1 + 2.9 = 5$ m

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9. $3 \sin x + 4 = 6$

$3 \sin x = 2$

$\sin x = \frac{2}{3}$

Related acute angle = $sin^{-1} \frac{2}{3} \approx 41.8°$ (to 1 d.p.)

Solutions in 1st (A) and 2nd (S) quadrants, so $x = 41.8°$ or $x = 180 - 41.8 = 138.2°$

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10. $Arc\ length = \frac{angle}{360} \times \pi d$

$69.4 = \frac{x}{360} \times \pi \times 30$

$69.4 \times 360 = 30\pi x$

$24\,984 = 30\pi x$

$x = 24\,984 \div 30\pi$

$\approx 265.1°$

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11. $EC^2 = 24^2 + 6^2 + 8^2$

$= 576 + 36 + 64$

$= 676$

$EC = \sqrt{676}$

$= 26$ cm

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12. $\frac{2ab + 6a}{b^2 - 9} = \frac{2a(b+3)}{(b-3)(b+3)}$

$= \frac{2a}{b-3}$

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13. $\frac{\sin x° + 2\cos x°}{\cos x°} = \frac{\sin x°}{\cos x°} + \frac{2\cos x°}{\cos x°}$

$= \tan x° + 2$

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14. $\frac{AC}{\sin 12°} = \frac{15}{\sin 16°}$

$AC = \frac{15 \sin 12°}{\sin 16°} = 11.3144...$

$\cos 28° = \frac{BC}{11.3144...}$

$BC = 11.3144... \times \cos 28° \approx 9.99$ m
