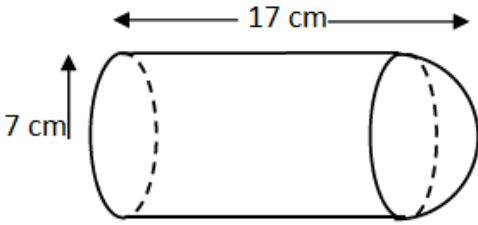

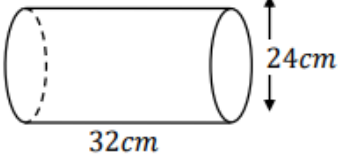
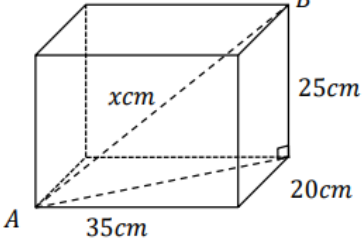


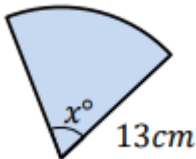
A	May Practice Test – Calculator	
1	<p>£40 000 is invested in a long-term savings account for 3 years. The savings account pays interest at a rate of 5% per year. Calculate the total in the savings account after 3 years.</p>	3
2	Expand and simplify $(4x - 5)(x^2 - 3x + 11)$	3
3	<p>A sector of a circle has a centre angle of 55° and a radius of 8 centimetres. Calculate the length of the arc for this sector.</p>	3
4	<p>A sample of seawater contains 1.35×10^{-6} grams of pollutant in each millilitre of water. How much pollutant would be in 8 litres of seawater. Give your answer in scientific notation.</p>	3
5	Write $x^2 + 12x + 34$ in completed square form $(x + a)^2 + b$	2
6	<p>This shape shown above a hemisphere placed on top of a cylinder.</p>  <p>The cylinder and hemisphere both have a radius of 7 centimetres. The whole shape has a height of 17 centimetres. Calculate the volume of this shape. Give your answer correctly rounded to 2 significant figures.</p>	5
7	Solve the inequation $5 > 3 - 2(x + 5)$	3
8	<p>Daily temperatures were taken for a week in the month of April in Aberdeen. The temperatures (in $^\circ\text{C}$) were: 11, 9, 14, 12, 7, 8, 16,</p> <p>(a) Find the mean and standard deviation for these temperatures.</p> <p>(b) During the month of July temperatures were also recorded for one week. The average temperature was 18°C and the standard deviation was 4.2. Write two statements comparing the temperatures in April and July.</p>	4 2

9	(a) Factorise $x^2 - 16$ (b) Factorise $x^2 - 3x - 4$ (c) Hence simplify $\frac{x^2-4}{x^2-3x-4}$	1 1 2
10	A straight line has equation $y = 6x - 5$. (a) State the gradient of the line. (b) State the coordinates of one point on the equation of the line.	1
11	Simplify $(a^5)^2 \times a^4$.	2
35 marks		

Answers

1	$40\,000 \times \left(\frac{100+5}{100}\right)^3 = \pounds 46305$ or $40\,000 \times 1.05^3 = \pounds 46305$
2	$(4x - 5)(x^2 - 3x + 11) = 4x^3 - 12x^2 + 44x - 5x^2 + 15x - 55$ $= 4x^3 - 17x^2 + 59x - 55$
3	$Arc\ Length = \frac{55}{360} \times \pi \times 16 = 7.679 \dots$ Arc length is 7.7 cm
4	8 litres = 8,000 ml, $(1.35 \times 10^{-6}) \times 8000 = 0.0108$ 1.08×10^{-2} grams
5	$x^2 + 12x + 34 = (x + 6)^2 + 34 - 6^2 = (x + 6)^2 - 2$
6	The volume of this solids is $V_{cylinder} + V_{hemisphere}$ or $\pi \times r^2 \times h + \frac{4}{3} \times \pi \times r^3 \div 2$ For the cylinder the height is 17 – radius = 10 cm, $V_{cylinder} = \pi \times 7^2 \times 10$ (1539.3804) $V_{hemisphere} = \frac{4}{3} \times \pi \times 7^3 \div 2$ (718.3775 ...) Total volume is 1539.3801 + 718.3775 = 2257.7579, 2300 cm³
7	$5 > 3 - 2(x + 5), 5 > 3 - 2x - 10, 5 > -7 - 2x, 12 > -2x,$ so $-12 < 2x$ or $2x > -12, x > -6$
8	The mean is 11°C . The totals for the tables are $\sum x = 77, \sum x^2 = 911,$ or $\sum x = 77, \sum (x - \bar{x})^2 = 146$ The standard deviation is $\sqrt{\frac{911 - \frac{77^2}{7}}{6}} = 3.27^\circ\text{C}$ or $\sqrt{\frac{64}{6}} = 3.27^\circ\text{C}$ On average temperatures were higher in July, but the temperatures were less consistent than in April.
9	(a) $x^2 - 16 = (x + 4)(x - 4)$ (b) $x^2 - 3x - 4 = (x - 4)(x + 1)$ (c) $\frac{x^2-16}{x^2-3x-4} = \frac{(x+4)(x-4)}{(x-4)(x+1)} = \frac{x+4}{x+1}$
10	(a) The gradient of the line is 6 (b) Choose a value for x such as $x = 2$ and substitute this into the equation to get the y -value. $y = 6 \times 2 - 5, y = 12 - 5 = 7$ the coordinate is (2, 7)
11	$(a^5)^2 \times a^4 = a^{10} \times a^4 = a^6$

B	May Practice Test – Calculator		
1		<p>A spherical balloon has a volume of approximately 14 000 cubic centimetres.</p> <p>The balloon deflates evenly by 20% per day. What is the expected volume of the balloon after 4 days.</p> <p>Give your answer rounded to the nearest thousand.</p>	4
2	<p>For the data set shown below find the median and the interquartile range (IQR)</p> <p style="text-align: center;">22 25 28 29 30 35 36 38 38</p>		2
3	<p>Find the equation of the straight line through the points $(0, -9)$ and $(3, 0)$.</p> <p>Give your answer in the simplest form</p>		3
4	<p>(a) Factorise $x^2 - 9y^2$</p> <p>(b) Expand and simplify $(4x^2 + 3)(x^2 - 1)$</p>		2 3
5		<p>A cylinder has a diameter of 24 centimetres and a height of 32 centimetres. Calculate the volume of this cylinder. Give your answer rounded to 3 significant figures.</p>	3
6	<p>Solve the inequation $5(4 - x) > 10$</p>		2
7	<p>Use the laws of indices to express $\frac{10y}{c^2} \times \frac{c^5}{2y^3}$ in the simplest form</p>		3
8	<p>A cyclist recorded her times in July for a 20-mile cycle.</p> <p>The times in minutes are</p> <p style="text-align: center;">67 68 71 78 65 77</p> <p>Find the mean and standard deviation for these times.</p>		4
9		<p>Calculate the length of the space diagonal AB.</p>	3

10	A sector of has an area of 40 cm^2 and a radius of 13 centimetres. Calculate the size of the centre angle.		3
11	Add $\frac{7}{x+5} - \frac{2}{x+1}, x \neq -5, x \neq -1$		3
35 marks			

Answers

1	$14\,000 \times \left(\frac{100-20}{100}\right)^4 = 5734.40$ or $14\,000 \times 0.8^4 = 5734.40$ Answer is 6,000 cm³
2	Median is 30. Lower quartile is 26.5. Upper quartile is 37. IQR = $37 - 26.5 = 10.5$
3	Gradient is $\frac{-9}{-3} = 3$ $y = mx + c$ $-9 = 3 \times 0 + c, c = -9$ $y = 3x - 9$
4	(a) $x^2 - 9y = (x + 3y)(x - 3y)$ (b) $(4x^2 + 3)(x^2 - 1) = 4x^4 - 4x^2 + 3x^2 - 3 = 4x^4 - x^2 - 3$
5	<i>radius is 12cm, height is 32 cm</i> $V = \pi \times 12^2 \times 32 = 14476.45892$ Volume is 14500 cm³
6	$5(4 - x) > 10, 20 - 5x > 10, -5x > -10$ $5x < 10$ so $x < 2$
6	
7	$\frac{10y}{c^2} \times \frac{c^5}{2y^3} = \frac{10c^5y}{2c^2y^3} = \frac{5c^3}{y^2}$
8	The mean is 71 minutes . The totals for the tables are $\sum x = 426, \sum x^2 = 30392,$ or $\sum x = 426, \sum (x - \bar{x})^2 = 146$ The standard deviation is $\sqrt{\frac{30392 - \frac{426^2}{6}}{5}} = 5.4$ or $\sqrt{\frac{146}{5}} = 5.4$
9	$AB = \sqrt{35^2 + 20^2 + 25^2} = \sqrt{2250} = 15\sqrt{10}$ or 47.43 cm
10	$40 = \frac{x}{360} \times \pi \times 13^2, x = \frac{40 \times 360}{169\pi}, x = 27^\circ$
11	$\frac{7}{x+5} - \frac{2}{x+1} = \frac{7(x+1) - 2(x+5)}{(x+5)(x+1)} = \frac{7x+7-2x-10}{(x+5)(x+1)} = \frac{5x-3}{(x+5)(x+1)}$

C	May Practice Test – Calculator	
1	Bacteria in a petri dish increase at a rate of 6% per hour. At 12 noon there are 500 bacteria in the petri dish. How many bacteria will be present three hours later?	3
2	Write $x^2 - 4x + 10$ in completed square form $(x + p)^2 + q$	2
3	<p>A sector of a circle has a centre angle of 42° and a radius of 16 centimetres.</p> <p>Calculate the area of this sector.</p>	3
4	<p>Find the volume of a cone with a diameter of 1.4 metres and a height of 120 centimetres.</p>	3
5	<p>Determine if this is a right-angled triangle.</p>	3
6	<p>A manufacturer of a 500 millilitre soft drink samples 10 bottles from its production line on a Monday. The capacity (in millilitres) for each bottle is:</p> <p style="text-align: center;">495 500 504 505 494 504 502 497 500 501.</p> <p>(a) Find the median and the semi-interquartile range for this sample.</p> <p>(b) On Thursday 10 bottles were also sampled. This time the median capacity is 500 ml and the semi-interquartile range is 2 ml. Make two valid comparisons comparing the results on Monday and Thursday.</p>	3 2
7	Find the equation of the straight line passing through the points $(1, -6)$ and $(3, -10)$. Give your answer in the simplest form	3
8	<p>Change the subject of the formula</p> $h = 5r^2 - x$ <p>to r</p>	3

9	An imported car costs £30993.75 after the addition of 12.5% import duty. How much did the car cost before the import duty was added on?	3
10	(a) Factorise $x^2 + 3x - 10$	2
	(b) Hence simplify $\frac{(x-2)^2}{x^2+3x-10}$	2
11	Use the laws of indices to express $\frac{4t^3}{s} \div \frac{8t}{s^2}$ in the simplest form	3
35 marks		

Answers

1	$500 \times \left(\frac{100+6}{100}\right)^2 = 595.5$ or $500 \times 1.06^3 = 595.5$
2	$x^2 - 4x + 10 = (x-2)^2 + 10 - (-2)^2 = (x-2)^2 + 6$
3	Area is $\frac{42}{360} \times \pi \times 8.3^2 = 25.249 \dots$ Area is 25.2 cm²
4	Diameter is 1.4 metres or 140 cm. Radius is 70 cm and height is 120 cm. $V_{\text{cone}} = \frac{1}{3} \times \pi \times 70^2 \times 120 = 615752.1601$, Volume is 615 752 cm³ Or $V_{\text{cone}} = \frac{1}{3} \times \pi \times 0.7^2 \times 1.2 = 0.6157521601$, Volume is 0.62 m³
5	$c^2 = 24.1^2 = 580.81$ $a^2 + b^2 = 12^2 + 20.9^2 = 580.81$ $24.1^2 = 12^2 + 20.9^2$ By the COP this is a right-angled triangle
6	Put the data in order 494 495 497 500 500 501 502 504 504 505 Median is 500.5 ml , $Q_1 = 497$, $Q_3 = 504$. SIQR is $\frac{504-497}{2} = 3.5$ ml On average the sample from Thursday was lower and closer to the stated volume. The sample from Thursday was also more consistent (less varied) than the sample from Monday.
7	The gradient is $-\frac{4}{2}$ or -2 . Using point $(1, -6)$ $y = mx + c$ so $-6 = (-2) \times 1 + c$, $c = -4$ The equation of the line is $y = -2x - 4$.
8	$h = 5r^2 - x$, $h + x = 5r^2$, $\frac{h+x}{5} = r^2$, $\sqrt{\frac{h+x}{5}} = r$ $r = \sqrt{\frac{h+x}{5}}$
9	$112.5\% = 30993.75$, $1\% = 275.50$ ($30993.75 \div 112.5$), $100\% = \mathbf{\pounds 27550}$
10	(a) $x^2 + 3x - 10 = (x+5)(x-2)$ (b) $\frac{(x-2)^2}{x^2+3x-10} = \frac{(x-2)(x-2)}{(x+5)(x-2)} = \frac{x-2}{x+5}$
11	$\frac{4t^3}{s} \div \frac{8t}{s^2} = \frac{4t^3}{s} \times \frac{s^2}{8t} = \frac{4s^2t^3}{8st} = \mathbf{\frac{st^2}{2}}$