

Question pack for Geometry, GCSE Exam

Included:

- 65 Normal Questions, in no particular order of difficulty.
- 10 Challenge Questions
- Exam Tips throughout
- All worked solutions are at the end of the booklet, highlighted in blue.

PLS Suggestion:

- We've included tonnes of questions to help you with your exams. It is completely up to you how you approach them, however, we would suggest doing 4-6 normal questions and one challenge question every time you revise this topic.
- Make a note of your mistakes and go back to the ones you got wrong at the end.
- Good Luck!

Important Information:

- All normal questions vary in difficulty form grade 3 up to grade 7. Challenge questions extend up to grade 9.
- Questions that are in red are non-calculator questions For example:

Question One: Would be a non-calculator question Question One: Would be a calculator question

PLS Tutors Ltd

| The PLS Tutors Limited Geometry | GCSE Question Packs | |
|---------------------------------|---|--|
| Geometry | Question No. | |
| Basic Geometry | 7, 33, 42, 46, 53, 55, | |
| Bearings | 61, 62, | |
| Circle Geometry | 1, 4, 9, 16, 18, 26, C1, C4, C6, C7, C9, C10, | |
| Congruent Shapes | 4, 47, C7, | |
| Four Transformations | 12, 28, 37, | |
| Loci & Construction | 41, 65, | |
| Perimeter & Area | 2, 16, 27, 34, 49, | |
| Polygons | 2, 7, 30, 39, 48, 52, 53, 55, 59, | |
| Projections | 63, 64, | |
| Pythagoras' Theorem | 3, 13, 43, 50, | |
| Shapes in 3D | 20, 21, 63, | |
| Similar Shapes | 14, 22, 38, | |
| Sine & Cosine Rules | 6, 36, 38, 40, 44, 45, 51, 54, 58, C2, C8, | |
| Sin, Cos, Tan Values | 11, 23, 31, 32, 56, <u>57, C</u> 3, C5, | |
| Trigonometry | 2, 5, 8, 10, 15, 17, 24, 35, | |
| Vectors | 19, 25, 29, 60, | |



Normal Difficulty Questions

Question 1: All points of triangle ABC below lie on the circle, where AB is the diameter of the circle. Find the size of angle ABC. Explain your answer.



Question 2: Find the area of the isosceles trapezium below. Give your answer to 3 significant figures.





Question 3: Point A has coordinates (2, 11) and point B has coordinates (10, 7). Find the exact length of the line AB.

Question 4: Prove that triangles ADE and BDC are congruent, given that points ABCE all lie on the circle circumference and EA = CB.



Question 5: Find the length of side x to 1 significant figure.



Question 6: An isosceles triangle has base 10cm and sides of length 13cm. Find the area of the triangle.



Question 7: For the triangle drawn below, show that y = x + z.



Question 8: Find the size of length y to 2 significant figures.



Question 9: ABD are points on the circle below, centre C. Find the size of angle ADC.





Question 10: The hypotenuse of the triangle below has length 28cm. Find the length of c.



Exam Tip - There are four acronyms to help your prove congruency between two shapes: SSS, SAS, ASA, RHS. S = Side, A = Angle, R = Right Angle, H = hypotenuse.

Question 11: Write down the value of sin 60°



Question 12: Find the transformation that maps shape A onto shape B.





Question 13: Calculate the size of angle CAB to 1 decimal place.



Question 14: The two triangles below are mathematically similar. Find the size of angle DEF.





Question 15: Calculate the size of length BC to 2 decimal places.



Question 16: Find the area of the circle sector below, given that the radius is 5cm. Give your answer in terms of π .



Question 17: Find the length of the hypotenuse for the triangle below to 3 significant figures.





GCSE Question Packs

Question 18: Prove that angle x = angle y.



Question 19: $\underline{a} = \begin{pmatrix} 7 \\ -2 \end{pmatrix}$ and $\underline{b} = \begin{pmatrix} -11 \\ 6 \end{pmatrix}$. Find $\underline{a} - \underline{b}$ and $4\underline{b} + 2\underline{a}$.

Question 20: A sphere has volume 478cm³. Find the radius of the sphere to 2 decimal places.

Exam Tip - If two shapes, A and B, are similar, all angles in shape A are the same size as the angles in shape B. The PLS Tutors Limited

Geometry

Question 21: The 3D shape below is comprised of two identical square based pyramids. The perpendicular height of one pyramid is 10cm and the length of one side of the base of a pyramid 6cm. Find the total volume of the 3D shape below.



Question 22: The triangles below are mathematically similar. Find the size of angle DEF.



Question 23: Write down the value of tan 45°.



Question 24: Find the length of x to 3 decimal places.



Question 25: $\underline{a} = \binom{12}{21}$, $\underline{b} = \binom{36}{21}$. Find the length of the vector \underline{ab} .

Question 26: The circle blow has centre C, where points ABDE lie on the circumference and line AB is the diameter of the circle. Find the size of angle DBE.



Making Learning Truly Personal, The PLS Tutors Limited.



Question 27: A rhombus has an area of 9cm². Find the area of the rhombus after each side has been enlarged by scale factor 4.

Question 28: Find the transformation that maps shape A onto shape B.







Question 30: Prove that C = D for the parallelogram below:



Exam Tip - You need to be able to recall from memory all values of sin x, cos x and tan x where x = [0, 30, 45, 60, 90].

Question 31: Write down the value of $\cos 30^\circ$.

Question 32: Write down the value of tan 60°.



Question 33: AB and CD are parallel lines. Find the size of angle x:



Question 34: An Isosceles triangle, ABC, is drawn. AB and AC both equal 10cm. Angle BAC = 60°. Find the area of the triangle in the form $a\sqrt{b}$.

Question 35: Find the length of a.



Question 36: Find the size of angle y to 1 decimal place.



Making Learning Truly Personal, The PLS Tutors Limited.







Question 38: Given that the two triangles below are mathematically similar, find the length of side DF.



Making Learning Truly Personal, The PLS Tutors Limited.



Question 39: Find the sum of the interior angles in a regular hexagon, as well as the size of one exterior angle.

Question 40: Use the cosine rule to find the size of length x to 2 decimal places.



Exam Tip - The cosine rule and sine rule are not given to you in the exam.

Question 41: Construct a rectangle with width 5cm and length 10cm.

Question 42: The angles in a triangle are 2x, 3x - 25 and x - 35. Find x.



Question 43: Calculate the perpendicular height of the pyramid below.



- Question 44: A triangle has sides of length 8cm, 7cm and ycm. The angles opposite these length are 56°, x° and a° respectively. Find the size of angle x.
- Question 45: Use the sine rule to find the size of angle x to 1 significant figure.





Question 46: Lines AB and CD are parallel. EF and GH are straight lines. Find the size of the angle marked y:



Question 47: Define 'congruent shapes'.

Question 48: A regular hexagon is drawn below, centre O. Find the sizes of angles x and y.





Question 49: Calculate the area of the triangle below.



Question 50: Find the area of the triangle below.



Exam Tip - When proving a circle theorem, you are allowed to use other circle theorems to prove your point.

Question 51: Write down the sine rule.

Question 52: Find the size of the angles in a regular 13 – sided shape as well as the size of one of the exterior angles.

Question 53: One angle in a parallelogram is 57°, find the size of the other three angles.



GCSE Question Packs

Question 54: Re-arrange the cosine rule to make Cos A the subject.

Question 55: Each interior angle in a regular polygon is 156°. Find the number of sides on the polygon.

Question 56: Complete the table:

| | 30° | 45° | 60° |
|-----|-----|-----|-----|
| Sin | | | |
| Cos | | | |

Question 57: Write down the value of $\tan 0^\circ$.

Question 58: Write down the cosine rule.



Question 59: Two triangles are put together to make kite WXYZ. The line XY is the same length as line YC. Find the size of angle WXY.



Question 60: Shape ABCD below is a parallelogram. M is a point on DC such that DM : MC = 3 : 2. Line BC is extended to point W. The line AMW is a straight line. Find the ratio BC : CW.



Making Learning Truly Personal, The PLS Tutors Limited.



Exam Tip - Remember that for bearings you need to know three things: Always go clockwise, always give answers in three-digitform and always start from the north line.

Question 61: For the diagram below, find the bearing of B from A.



Question 62: Study the diagram below. Some third location, C, is on a bearing of 150° from A. The bearing of C from B is 255°. Mark the location of C on the diagram.



Making Learning Truly Personal, The PLS Tutors Limited.



Question 63: A 3D cone, as shown below, has perpendicular height 12cm and base area 25π . Draw a sketch of the side elevation of the cone.



Question 64: A magnet is drawn below. The vertical height of the magnet is 10cm. The depth of the magnet is 2cm, as shown in the diagram. Sketch out the side elevation (side profile) of the magnet.



Making Learning Truly Personal, The PLS Tutors Limited.



Question 65: A dog is tied to a post outside a shop. The lead used allows the dog to venture a maximum of 1.5m from the post. Using the scale 1cm = 0.5m, shade the region where the dog can reach.

Challenge Questions

Challenge 1: For the circle below, prove that opposite angles in a cyclic quadrilateral sum to 180°.



Challenge 2: Use the cosine rule to find the size of angle y to 1 decimal place.





GCSE Question Packs

Challenge 3: What is the value of tan 90°?

Challenge 4: Prove that the size of angle y is double the size of angle x.



Challenge 5: Find the value exact of tan 30° + sin 45° + cos 0° .



Challenge 6: The circle below, centre O, has three points Y, B and Z all on the circumference. Length OX = 90cm. Find the length of the arc YBZ.





Making Learning Truly Personal, The PLS Tutors Limited.



Challenge 8: Find the area of the quadrilateral below given that AB = 1.86m.



Challenge 9: Prove that angle x is a right angle, given that line AB is the diameter to the circle.





Challenge 10: Prove that angle x = angle y and angle a = angle b.



Answers on next page

The PLS Tutors Limited Geometry GCSE Question Packs LACB is a right angle because the triongle is drawn from the diameter and tauches circumference. 90 + 27 = 117 180 - 117 = 63° Angles in a triangle sum to 180° $\angle ABC = 63$

The PLS Tutors Limited Geometry 2

GCSE Question Packs













Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.



GCSE Question Packs



Cosine rules a'= 6 + c - zbc cos A 10=13+13-7(13)(13) × cos >c 100 = 338 - 338 cos sc -238 = - 338 cos 30 Cossc = 238 $\propto = \cos^{-1}\left(\frac{238}{338}\right)$ JC= 45.2397 Area of triangle = zab sin c

= - 1 (13)(13)(sin 45.2307) = 160 cm²

Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.

The PLS Tutors Limited Geometry GCSE Question Packs (3) $Ean \ 68 = \frac{9}{34}$ $9 = 34 \ 4an \ 68$ $9 = 84 \ cm$

> DCBA is a quadrilateral, all angles in a quadrilateral sum to 360°

 (\mathbf{q})

ZDAB= 65.5° because angles at the centre are twice angles on the circumference

∠ DCB = 360 - 131 = ZZ9° since
angles around a point sum to 360°
Let ∠ADB = DC

65.5 + 37 + 220 + x = 360 331.5 + x = 360 $x = 28.5^{\circ}$


Top vertex of B has coordinates (61-2)

 x_{0}° 6--z=8 y_{0}° -z-4=-6 Transformation = Translation [3]





Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.



$$4b + 2a = 4\binom{-11}{6} + 2\binom{7}{-2}$$

= $\binom{-44}{24} + \binom{14}{-4}$
= $\binom{-30}{20}$



PLS Tutors Geometry The PLS Tutors Limited **GCSE** Question Packs Equation for volume of pyramid = 1 x base area x height Volume of one pyramid : $\frac{1}{3} \times (6)(6) \times 10$ = 120cm 120 XZ = 240cm

The PLS Tutors Limited Geometry GCSE Question Packs The PLS Tutors Limited Geometry

 $a^{2} = b^{2} + c^{2} - zbc \cos A$ $5^{2} = 7^{2} + 6^{2} - z(7)(6) \times \cos A$ $75 = 85 - 84\cos A$ $-60 = -84\cos A$ $\cos A = \frac{60}{84}$ $A = \cos^{-1}\left(\frac{60}{84}\right)$ $A = 44.4^{2}$ $\angle ABC = 44.4^{2} \quad a^{2} = 44.4^{2}$



2

 $\frac{5z}{z} = 1$ $\frac{5z}{z}$ $\frac{5z}{z} = 1$



Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.



Explanation "



Making Learning Truly Personal, The PLS Tutors Limited.





Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.





The PLS Tutors Limited Geometry OCSE Question Packs
(33) To find DF, we first need to
Find the scale Factor as well
as length of side AC.
Use sire rule to find AC

$$\frac{7}{5in 60} = \frac{AC}{5in 80}$$

 $AC = \sin 80 \times \frac{7}{5in 60}$
 $AC = 7.96 \text{ cm}$
 $\frac{11}{7} = \text{scale factor} = 1.571$
 $1.571 \times 7.96 = 12.5 \text{ cm}$

Making Learning Truly Personal, The PLS Tutors Limited.









muning Learning Irany I ersonan, Ine I Lo Ianors Linniea.





Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.





Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.





PLS Tutors The PLS Tutors Limited Geometry 60 continued



GCSE Question Packs

Making Learning Truly Personal, The PLS Tutors Limited.

The PLS Tutors LimitedGeometryGCSE Question PacksQuestion 61: For the diagram below, find the bearing of B from A.



PLS Tutors

Question 62: Study the diagram below. Some third location, C, is on a bearing of 150° from A. The bearing of C from B is 255°. Mark the location of C on the diagram.





Making Learning Truly Personal, The PLS Tutors Limited.


Making Learning Truly Personal, The PLS Tutors Limited.



The PLS Tutors Limited Geometry **GCSE** Question Packs Challenge one 10 We know from other circle theorems that angles at the centre are double the size of angles at the circumference. Hence, we can label za and Zb on the diagram Angles around a point sum to 360° Za + zb = 360° at b= 180° as required



Making Learning Truly Personal, The PLS Tutors Limited.



The PLS Tutors Limited Geometry
Challenge four continued
360 -
$$zw - zy + a = 360$$

 $-zw - zy + a = 360$
 $-zw - zy + a = 0$
 $a = zw + zy$
 $a = z(w + y)$
 $a = angle at centre$
 $w + y = angle at centre$
 $w + y = angle at circum ference$
 $a = z(w + y)$



Making Learning Truly Personal, The PLS Tutors Limited.



Making Learning Truly Personal, The PLS Tutors Limited.





Making Learning Truly Personal, The PLS Tutors Limited.

The PLS Tutors Limited Geometry **GCSE** Question Packs hallenge nine 0 If we draw a line from the centre of the circle, we get two isosceles triangles, meaning we can label the angles a and b Angles in a triangle sum to 180° So a + a + b + b = 180Za + Zb = 180 atb = no as required.



Making Learning Truly Personal, The PLS Tutors Limited.



Geometry

We hope this question pack was helpful. We opted for handwritten worked solutions as a pose to standard mark-scheme type answers found elsewhere. If you're still struggling, you can find in-depth video walkthrough solutions for every question in this pack on our website as well as lots more question packs for other GCSE topics.

Also, challenge papers can be found on our website too if you're feeling especially confident with the content.

Thank you The PLS Tutors

http://www.plstutors.co.uk/

© 2023, The PLS Tutors Ltd