

# MATHEMATICS TRANSFER EXAM - exemplar

for the IB Diploma class

## INSTRUCTIONS

**There are 10 questions. The total mark for this exam is 44.**

**The marks for each question are shown in brackets  
– use this as a guide as to how much time to spend on each question.**

**You must show all your working as partial marks may be awarded.**

**You can use a scrap paper for rough sketches and calculations; however, this will not be assessed.**

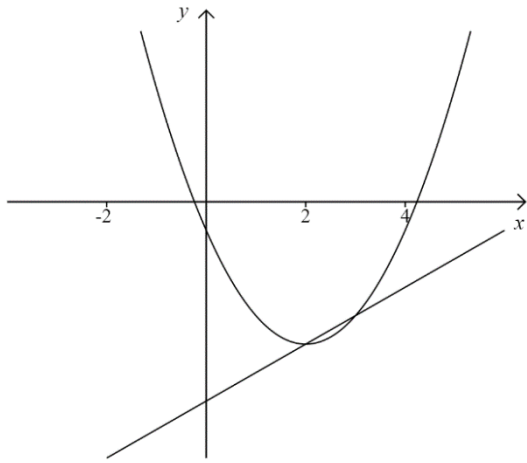
**Only work clearly communicated in the exam booklet will be assessed.  
Make sure you write your final answer on the line provided.**

**Calculator and formula booklet may not be used.**

**You may use a ruler, protractor, pen, pencil and the following table of trigonometric values:**

	0°	30°	45°	60°	90°
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	undefined

1.	<p>Light travels through space at approximately <math>3 \times 10^8 \text{ m/s}</math>. Calculate how far light travels in one hour. Write your answer in metres using scientific notation.</p> <p style="text-align: right;">.....</p>	(3)
2.	<p>The diagram shows a pyramid.  The base of the pyramid ABCD is a square.  <math>AB = 4 \text{ cm}</math> and angle <math>PAC = 60^\circ</math>.  Calculate the volume of the pyramid.  Give your answer in the exact (surd) form.</p> <div style="text-align: right; margin-right: 200px;"> </div> <p style="text-align: right;">.....</p>	(5)
3.	<p>A 12-storey tall building has an elevator that stops at every floor. The elevator takes 8 seconds to travel one floor, 14 seconds to travel two floors, 20 seconds to travel three floors and 26 seconds to travel four floors.</p> <p>Let <math>T_n</math> be the time take to travel <math>n</math> floors.</p> <p>a) Show that <math>T_n</math> forms a linear (arithmetic) sequence.</p> <p>.....</p> <p>.....</p> <p>b) Find a formula for <math>T_n</math>.</p> <p style="text-align: right;">.....</p> <p>c) Find the greatest number of floors that the elevator could travel in under a minute.</p> <p style="text-align: right;">.....</p>	<p>(1)</p> <p>(2)</p> <p>(2)</p>
4.	<p>The diagram shows the parabola <math>y = x^2 - 4x - m</math> and the line <math>y = mx + c</math> where <math>m, c \in \mathbb{R}</math>.  The <math>x</math>-coordinates of the points of intersection of the parabola and the line are <math>x = 2</math> and <math>x = 3</math>.</p>	(4)



Find the values of  $m$  and  $c$ .

$m = \dots\dots\dots$

$c = \dots\dots\dots$

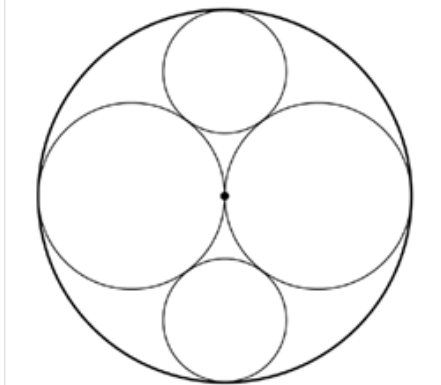
5. There are 18 packets of sweets and 12 boxes of sweets in a carton. The mean number of sweets in all the 30 packets and boxes is 14. The mean number of sweets in the 18 packets is 10. Work out the mean number of sweets in the boxes.

(4)

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6. The largest circle in the diagram below has a diameter of 20 cm. Calculate the exact diameter of each of the smallest circles.

(5)



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7. Shapes A, B and C are similar. The height of shape A is 8cm. The height of shape C is 4cm. The ratio of the surface area of shape B to the surface area of shape C is 25:9 Work out the ratio of the volume of shape A to shape B.

(4)

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8. There are only  $r$  red counters and  $g$  green counters in a bag. A counter is taken at random from

(5)

	<p>the bag. The probability that the counter is green is <math>\frac{3}{7}</math>. The counter is put back in the bag. 2 more red counters and 3 more green counters are put in the bag. A counter is taken at random from the bag. The probability that the counter is green is <math>\frac{6}{13}</math>. Find the number of red counters and the number of green counters that were originally in the bag.</p> <p style="text-align: right;">Red .....</p> <p style="text-align: right;">Green .....</p>	
<p><b>9.</b></p>	<p>Given the exponential function with equation <math>y = pq^x</math> where <math>p</math> and <math>q</math> are constants and the points with coordinates (0, 8), (1, 18) and (1.5, k) that lie on the graph of this function.</p> <p>a) Sketch the graph of this function.</p> <div style="text-align: center;">  </div> <p>b) Calculate the values of <math>p</math>, <math>q</math> and <math>k</math>.</p> <p style="text-align: right;"><math>p</math>..... <math>q</math>..... <math>k</math>.....</p>	<p>(2)</p> <p>(4)</p>
<p><b>10.</b></p>	<p>Simplify fully <math>\frac{(4+2\sqrt{3})(4-2\sqrt{3})}{\sqrt{11}}</math>. You must show all your working.</p> <p style="text-align: right;">.....</p>	<p>(3)</p>