

Arizona’s College and Career Ready Standards – Mathematics for ACCOUNTING AND RELATED SERVICES

Number and Quantity: Quantities ★ (N-Q)					
Reason qualitatively and use units to solve problems.					
<u>Standards</u> <i>Students are expected to:</i>	<u>TRAD</u>	<u>Mathematical Practices</u>	<u>CTE Standard / Measurement Criterion</u>	<u>Application of Mathematics Standard</u>	<u>Explanations and Examples</u>
HS.N-Q.A.2. Define appropriate quantities for the purpose of descriptive modeling. Connection: <i>SSHS-S5C5-01</i>	A I A II ★	<i>HS.MP.4.</i> Model with mathematics. <i>HS.MP.6.</i> Attend to precision.	8.1 9.2 – Use spreadsheet and/or accounting software to prepare charts and graphs useful in analyzing the financial condition of a business.	To analyze the income statement of a business	A company buys a piece of equipment for \$1million and expects it to have a useful life of 10 years. If it will be depreciated over 10 years, how would you express the depreciation? A. \$100,000 per year B. \$10,000 per year C. 1 year per \$5,000 D. \$5,000 per year
HS.N-Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	A I	<i>HS.MP.5.</i> Use appropriate tools strategically. <i>HS.MP.6.</i> Attend to precision.	4.1 – Prepare and journal payroll records using manual and computerized systems. 4.2 – Calculate earnings for various methods of compensation (hourly and salary.) 4.3 – Compute employee		Todd earned gross pay of \$932.15 for the pay period ending February 3 rd . Calculate the employer’s total payroll taxes using the following percentages: Social Security 6.2%, Medicare 1.45%, State Unemployment 5.4%, and Federal Unemployment 0.8%. A. \$129.10 C. \$874.36 B. \$57.80 D. \$803.0

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			deductions to determine net pay. 4.4 - To calculate employer's payroll taxes		

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Algebra: Seeing Structure in Expressions (A-SSE)					
Write expressions in equivalent forms to solve problems.					
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<p>HS.A-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. Connections: 9-10.WHST.1c; 11-12.WHST.1c</p> <p>a. Factor a quadratic expression to reveal the zeros of the function it defines.</p> <p>b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines</p> <p>Use the properties of exponents to transform expressions for exponential</p>	<p>A I A II ★</p>	<p><i>HS.MP.1.</i> Make sense of problems and persevere in solving them.</p> <p><i>HS.MP.2.</i> Reason abstractly and quantitatively.</p> <p><i>HS.MP.4.</i> Model with mathematics.</p> <p><i>HS.MP.7.</i> Look for and make use of structure.</p>			<p><u>Compound Interest Formula</u></p> $A = P \left(1 + \frac{r}{n} \right)^{(n \cdot t)}$ <p>Create an equivalent equation to determine the principal:</p> <p>A. $P = \frac{A}{\left(1 + \frac{r}{n} \right)^{(n \cdot t)}}$</p> <p>B. $P = \frac{\left(1 + \frac{r}{n} \right)^{(n \cdot t)}}{A}$</p> <p>C. $P = \frac{\left(1 + \frac{r}{n} \right)}{A^{(n \cdot t)}}$</p> <p>D. $P = A \left(1 + \frac{r}{n} \right)^{(n \cdot t)}$</p>

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<p>functions. For example the expression 1.15^t can be rewritten as</p> <p>$(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.</p>					

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HS.A-SSE.B.4. Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. <i>For example, calculate mortgage payments.</i> Connection: 11-12.RST.4	A II ★	<i>HS.MP.3.</i> Construct viable arguments and critique the reasoning of others. <i>HS.MP.4.</i> Model with mathematics. <i>HS.MP.7.</i> Look for and make use of structure.	9.2	Use spreadsheet and/or accounting software to prepare charts and graphs useful in analyzing the financial condition of a business.	<p>The ABC Company Enterprise starts saving for a business trip to Australia. It starts with \$220. Each month after, it plans to deposit 10% more than the previous month. Derive the formula for the sum of a finite geometric series and calculate how much money the company will have in 8 months.</p> <p>A. $S = \frac{220(1 - 1.1^8)}{1 - 1.1}$ S = \$2515.90</p> <p>B. $S = \frac{220(1 + 1.1^8)}{1 + 1.1}$ S = \$329.30</p> <p>C. $S = \frac{220(1 + 1.1^8)}{1 + 1.1}$ S = \$2515.90</p> <p>D. $S = \frac{220(1 - 1.1^8)}{1 - 1.1}$ S = \$329.30</p>

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Algebra: Creating Equations ★ (A-CED)					
Create equations that describe numbers or relationships.					
<u>Standards</u> <i>Students are expected to:</i>	<u>TRAD</u>	<u>Mathematical Practices</u>	<u>CTE Standard / Measurement Criterion</u>	<u>Application of Mathematics Standard</u>	<u>Explanations and Examples</u>
HS.A-CED.A.1. Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i>	A I A II ★	<i>HS.MP.2.</i> Reason abstractly and quantitatively. <i>HS.MP.4.</i> Model with mathematics. <i>HS.MP.5.</i> Use appropriate tools strategically.	9.2b	Analyze how different variables can affect the cash flow of a company by creating graphs and tables.	Trusted and True plans to sell garage door openers. The company plans to manufacture 15,000 door openers to be sold at \$240 each. The fixed costs are estimated to be \$142,570. Variable costs are \$35 per unit. How many garage door openers must be sold for Trusted and True to break even? *To calculate a BEP in Units, use the formula: $BEP = \frac{TFC}{(SPU - VCU)}$, or the total fixed cost (TFC) divided by the difference between the sales price per unit (SPU) and the variable cost per unit (VCU). A. 696 B. 686 C. 656 D. 676
HS.A-CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. <i>For example, represent inequalities describing</i>	A I ★	<i>HS.MP.2.</i> Reason abstractly and quantitatively. <i>HS.MP.4.</i> Model with mathematics. <i>HS.MP.5.</i> Use appropriate tools strategically.	6.5 - To interpret financial information for decision making and planning		Question 1 A manager at an appliance store wants to order two types of washing machines. Type A costs \$250 and earns \$40 profit, while Type B costs \$400 and earns \$60 profit. Based on past sales, the manager expects to sell at least 100 washing machines this quarter. His total profit must be at least \$4,800. Create the constraints needed to calculate the least number of Type A washing machines the manager should order to minimize cost and reach his desired profit.

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<i>nutritional and cost constraints on combinations of different foods.</i>			8.1	- To analyze the income statement and balance sheet of a business	$x \geq 0$ $y \geq 0$ A. $x + y \geq 100$ $40x + 60y \geq 4800$ $x \geq 0$ $y \geq 0$ B. $x + y \geq 100$ $40x + 60y = 4800$ $x \geq 0$ $y \geq 0$ C. $250x + 400y \geq 100$ $40x + 60y = 4800$ $x \geq 0$ $y \geq 0$ D. $250x + 400y \geq 100$ $40x + 60y \geq 4800$

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					<p>Question 2</p> <p>Using the acceptable industry standards above, determine whether ABC Co. has unacceptable component percentages.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th><u>Sales</u></th> <th><u>Amount</u></th> <th><u>Component %</u></th> </tr> </thead> <tbody> <tr> <td></td> <td align="right">\$334,347.61</td> <td align="right">100%</td> </tr> <tr> <td>Cost of Merchandise Sold</td> <td align="right">\$114,000.00</td> <td></td> </tr> <tr> <td>Gross Profit on Sales</td> <td align="right">\$220,000.00</td> <td></td> </tr> <tr> <td>Total Expenses</td> <td align="right">\$119,000.00</td> <td></td> </tr> <tr> <td>Net Income before federal income tax</td> <td align="right">\$101,000.00</td> <td></td> </tr> <tr> <td colspan="3"> <u>Acceptable Industry Standards</u></td> </tr> <tr> <td>Cost of Merchandise Sold</td> <td align="right">not more than 46%</td> <td></td> </tr> <tr> <td>Gross Profit on Sales</td> <td align="right">not less than 54%</td> <td></td> </tr> </tbody> </table>	<u>Sales</u>	<u>Amount</u>	<u>Component %</u>		\$334,347.61	100%	Cost of Merchandise Sold	\$114,000.00		Gross Profit on Sales	\$220,000.00		Total Expenses	\$119,000.00		Net Income before federal income tax	\$101,000.00		 <u>Acceptable Industry Standards</u>			Cost of Merchandise Sold	not more than 46%		Gross Profit on Sales	not less than 54%	
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					<div style="border: 1px solid black; padding: 10px; margin-bottom: 10px;"> <p>Total Expenses not more than 35%</p> <p>Net Income before federal income tax not less than 19%</p> </div> <p>A. Total Expenses are unacceptable. B. Cost of Merchandise Sold is unacceptable. C. Gross Profit on Sales is unacceptable. D. Net Income before federal income tax is unacceptable.</p>
<p>HS.A-CED.A.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. <i>For example, rearrange Ohm’s law $V = IR$ to highlight resistance R.</i></p>	<p>A ★</p>	<p><i>HS.MP.2.</i> Reason abstractly and quantitatively. <i>HS.MP.4.</i> Model with mathematics. <i>HS.MP.5.</i> Use appropriate tools strategically. <i>HS.MP.7.</i> Look for and make use of structure.</p>	<p>2.3</p>	<p>To demonstrate the fundamental Accounting Equation</p>	<p>Question 1 Solve the Accounting Formula to highlight Owner’s Equity. Accounting Formula: $Assets = Liabilities + Owner’s Equity$</p> <p>A. Owner’s Equity = Assets – Liabilities B. Owner’s Equity = Assets + Liabilities C. Owner’s Equity = Liabilities – Assets D. Owner’s Equity = (Assets) (Liabilities)</p> <p>Question 2 Rearrange the formula for the break-even point, rearrange the formula $px = vx + FC$ to highlight x, the number of units sold. A. $x = \frac{FC}{p - v}$</p>

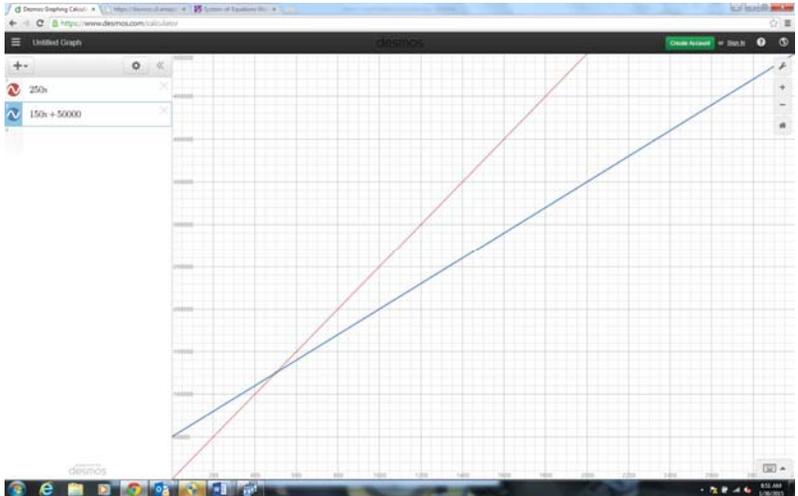
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					<p>B. $x = \frac{FC}{p+v}$</p> <p>C. $x = \frac{p-v}{FC}$</p> <p>D. $x = \frac{p+v}{FC}$</p> <p>Solution:</p> <p>$px = vx + PC$ $px - vx = PC$ $x(p - v) = PC$ $\frac{x(p - v)}{(p - v)} = \frac{PC}{(p - v)}$ $x = \frac{PC}{(p - v)}$</p>

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Algebra: Reasoning with Equations and Inequalities ★ (A-REI)

Solve systems of equations.

<u>Standards</u> <i>Students are expected to:</i>	<u>TRAD</u>	<u>Mathematical Practices</u>	<u>CTE Standard / Measurement Criterion</u>	<u>Application of Mathematics Standard</u>	<u>Explanations and Examples</u>
<p>HS.A-REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.</p> <p>Connection: <i>ETHS-S6C2-03</i></p>	<p>A I A II</p>	<p><i>HS.MP.2.</i> Reason abstractly and quantitatively.</p> <p><i>HS.MP.4.</i> Model with mathematics.</p> <p><i>HS.MP.5.</i> Use appropriate tools strategically.</p> <p><i>HS.MP.6.</i> Attend to precision.</p> <p><i>HS.MP.7.</i> Look for and make use of structure.</p> <p><i>HS.MP.8.</i> Look for and express regularity in repeated reasoning.</p>	<p>6.6a – Analyze the effect that a change in operating cost has on financial performance.</p> <p>9.2b – Analyze how different variables can affect the cash flow of a company by creating graphs and tables.</p>	<p>Writing an equation for Revenue and Cost, graphing both equations, evaluating the graph for the break even point.</p>	<p>The company accountant explains to the manager that if they sold 500 skateboards, the company would break even. The manager was a little confused and asked for a visual. The accountant said he could find the equations and graph them.</p> <p>What is the equation for Revenue? What is an equation for Cost? Graph both of these. Where do they intersect? That’s the break-even point.</p>  <p>Revenue=250x x=units (number of skateboards) sold C=150x+50,000 x=units (number of skateboards) sold They intersect when they sell 500 skateboards.</p>

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Functions: Interpreting Functions (F-IF)					
Interpret functions that arise in applications in terms of context.					
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<p>HS.F-IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.</p> <p>Connections: <i>ETHS-S1C2-01; 9-10.RST.3</i></p>	<p>A I A II ★</p>	<p><i>HS.MP.2.</i> Reason abstractly and quantitatively.</p> <p><i>HS.MP.4.</i> Model with mathematics.</p> <p><i>HS.MP.5.</i> Use appropriate tools strategically.</p>	<p>8.6</p>	<p>To determine the effect of changes in sales volume, unit costs and unit sales process on net income</p>	<p>Arlington Coat Co. is trying to figure out how many coats to have in stock for the winter season. It is looking at data showing coat sales as a function of average temperature for the winter season. The points graphed are (50°, 120 coats) and (30°, 200 coats).</p> <p>What is the slope? What is your interpretation of the slope? The slope = -4. Arlington Coat Company sells 4 less coats for every degree the temperature rises.</p>

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Analyze functions using different representation.																							
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F-IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. ★A-REI.D.10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the	A I A II + ★	HS.MP.5. Use appropriate tools strategically. HS.MP.6. Attend to precision.	4.2a - Compare and contrast an employee’s earnings based on various compensation methods (commissions, hourly, and salary). 4.2b - Analyze the potential earnings of an employee based on various methods of compensation (commissions, hourly, and salary).	Using a table and a graph analyze the key features and be able to describe verbally the relationship between the hours and the income based on the two job options.	<p>Jose has a job and gets paid \$11.50/hourly, and works 40 hours. He gets paid time and a half for every hour of overtime that he works. He is offered a new job that gives him a salary of \$650 a week, however he would have to work a minimum of 50 hours a week. Should Jose accept the offer? Make a table and graph to compare the two options. Write a description of your findings.</p> <table border="1"> <thead> <tr> <th>Hours</th> <th>Option 1</th> <th>Option 2</th> </tr> </thead> <tbody> <tr> <td>40</td> <td>\$460.00</td> <td></td> </tr> <tr> <td>45</td> <td>\$546.25</td> <td></td> </tr> <tr> <td>50</td> <td>\$632.50</td> <td>\$650</td> </tr> <tr> <td>55</td> <td>\$718.75</td> <td>\$650</td> </tr> <tr> <td>60</td> <td>\$805.00</td> <td>\$650</td> </tr> </tbody> </table> 	Hours	Option 1	Option 2	40	\$460.00		45	\$546.25		50	\$632.50	\$650	55	\$718.75	\$650	60	\$805.00	\$650
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coordinate plane, often forming a curve (which could be a line).					

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Functions: Building Functions (F-BF)					
Build a function that models a relationship between two quantities.					
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<p>HS.F-BF.A.1. Write a function that describes a relationship between two quantities.</p> <p>Connections: <i>ETHS-S6C1-03; ETHS-S6C2-03</i></p>	<p>A I A II + ★</p>	<p><i>HS.MP.1.</i> Make sense of problems and persevere in solving them.</p> <p><i>HS.MP.2.</i> Reason abstractly and quantitatively.</p> <p><i>HS.MP.4.</i> Model with mathematics.</p> <p><i>HS.MP.5.</i> Use appropriate tools strategically.</p> <p><i>HS.MP.6.</i> Attend to precision.</p> <p><i>HS.MP.7.</i> Look for and make use of structure.</p> <p><i>HS.MP.8.</i> Look for and express regularity in repeated reasoning.</p>	<p>1.3</p>	<p>To demonstrate the fundamental Accounting Equation</p>	<p>What is the function to calculate Owner’s Equity given these figures?</p> <p>Assets: \$18,000 Liabilities: \$10,000 Sales: \$15,000 Expenses: \$ 10,000</p> <p>A. Owner’s Equity = \$18,000 - \$10,000 B. Owner’s Equity = \$18,000 + \$10,000 C. Owner’s Equity = \$18,000 - \$15,000 D. Owner’s Equity = \$15,000 - \$10,000</p>

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Functions: Linear, Quadratic, and Exponential Models ★ (F-LE)																	
Construct and compare linear, quadratic, and exponential models and solve problems.																	
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<p>HS.F-LE.A.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.</p> <p>Connections: <i>ETHS-S6C2-03;</i> <i>SSHS-S5C5-03</i></p>	<p>A I ★</p>	<p><i>HS.MP.3.</i> Construct viable arguments and critique the reasoning of others.</p> <p><i>HS.MP.4.</i> Model with mathematics.</p> <p><i>HS.MP.5.</i> Use appropriate tools strategically.</p> <p><i>HS.MP.7.</i> Look for and make use of structure.</p> <p><i>HS.MP.8.</i> Look for and express regularity in repeated reasoning.</p>	<p>5.6a – Compare and contrast the impact of various depreciation methods.</p>	<p>Compare straight line depreciation (linear) to double declining depreciation (exponential).</p>	<p>Julia owns a company and buys a cabinet for \$700 (original cost). She thinks it will be useful for 5 years (useful life). After 5 years, she thinks it will be worth \$100 (salvage value).</p> <p>Calculate the annual depreciation.</p> $\text{Annual Depreciation} = \frac{(700-100)}{5} = \frac{600}{5} = 120$ <p>Calculate depreciation and book value for five years: Year Rate Depreciation Book Value</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Depreciation Rate</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20%</td> </tr> <tr> <td>2</td> <td>20%</td> </tr> <tr> <td>3</td> <td>20%</td> </tr> <tr> <td>4</td> <td>20%</td> </tr> <tr> <td>5</td> <td>20%</td> </tr> </tbody> </table> <p>Can you develop a formula for the book value after t years? Book Value = original cost (1-r)^t Book Value=700(.8)^5 Book Value=\$229.38</p>	Year	Depreciation Rate	1	20%	2	20%	3	20%	4	20%	5	20%
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Interpret expressions for functions in terms of the situation they model.					
<u>Standards</u> <i>Students are expected to:</i>	<u>TRAD</u>	<u>Mathematical Practices</u>	<u>CTE Standard / Measurement Criterion</u>	<u>Application of Mathematics Standard</u>	<u>Explanations and Examples</u>
HS.F-LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context. Connections: <i>ETHS-S6C1-03; ETHS-S6C2-03;SSHS-S5C5-03; 11-12.WHST.2e</i>	A I A II ★	<i>HS.MP.2.</i> Reason abstractly and quantitatively. <i>HS.MP.4.</i> Model with mathematics.	5.5	To compute the cost basis of assets	A function in the form of $f(n) = P(1+r)^n$ is used to model the amount of money in a savings account that earns 5% interest, compounded annually, where n is the number of years since the initial deposit. What is the value meaning of the constant P in terms of the savings account? A. P is the principal or the original amount deposited. B. P is the period of the investment C. P is the partial amount at any time D. P is the part of money at any time

Arizona’s College and Career Ready Standards – Mathematics for ACCOUNTING AND RELATED SERVICES

Statistics and Probability: Making Inferences and Justifying Conclusions ★ (S-IC)					
Make inferences and justify conclusions from sample surveys, experiments, and observational studies.					
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<p>HS-S-IC.B.6. Evaluate reports based on data.</p> <p>Connections: 11-12.RST.4; 11-12.RST.5; 11-12.WHST.1b; 11-12.WHST.1e</p>	A II ★	<p><i>HS.MP.1.</i> Make sense of problems and persevere in solving them.</p> <p><i>HS.MP.2.</i> Reason abstractly and quantitatively.</p> <p><i>HS.MP.3.</i> Construct viable arguments and critique the reasoning of others.</p> <p><i>HS.MP.4.</i> Model with mathematics.</p> <p><i>HS.MP.5.</i> Use appropriate tools strategically.</p> <p><i>HS.MP.6.</i> Attend to precision.</p> <p><i>HS.MP.7.</i> Look for and make use of structure.</p> <p><i>HS.MP.8.</i> Look for and express regularity in repeated</p>	6.5	To interpret the information for decision-making and planning	<p>To whom is the distinction between current and non-current items important?</p> <p align="center">Investors, management, and creditors</p>

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		reasoning.			