# S3 Citizenship, Economics and Society Practice Paper

S3 | Citizenship, Economics and Society | Time: 75 minutes | Total: 100 marks | 24 questions

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## Part 1: Consumption and Opportunity Cost

**Show the formula, the substitution and the unit, then explain in words.**

**1. A S3 student has $18,000 a month from allowance and a part-time job. Fixed spending is $6,500 on rent, $800 on transport, $3,200 on food and $600 on utilities. Find total fixed spending, the disposable balance and the saving rate in per cent.**

**Answer:** Fixed spending = 6,500 + 800 + 3,200 + 600 = $11,100. Disposable balance = 18,000 - 11,100 = $6,900. Saving rate = 6,900 / 18,000 x 100% = 38.3%. Nearly 40% saved is high; the surplus can fund an emergency reserve or further study, but fixed spending already takes 62% of income, so there is little room if income falls.

**2. A course costs $4,800 and takes 40 hours; in the same time the student could work part time at $65 an hour. Find the opportunity cost of taking the course and explain why the fee is only part of it.**

**Answer:** Forgone earnings = 65 x 40 = $2,600. Opportunity cost = fee + forgone earnings = 4,800 + 2,600 = $7,400. Opportunity cost is the value of the best alternative given up, so it covers both the cash fee and the income (or leisure) sacrificed for class time; the time cost would only be zero if it had no alternative use.

**3. A household budget is $15,000: housing $6,000, food $3,750, transport $1,200, education $2,400, the rest other. Find the other amount and the housing and food shares of the budget; if food actually costs $4,200, find the overspend in per cent.**

**Answer:** Other = 15,000 - 13,350 = $1,650. Housing = 6,000 / 15,000 x 100% = 40%; food = 25%. Overspend = (4,200 - 3,750) / 3,750 x 100% = 12%. Housing plus food already take 65% and are necessities, so only the other items can be trimmed and the overspend must come from savings.

**4. A household income rises 2% while prices rise 3.2%. Find the percentage change in real purchasing power, and the cost of the same basket after one year if it now costs $24,000.**

**Answer:** Real change = (1 + 0.02) / (1 + 0.032) - 1 = -1.16%. A 2% pay rise therefore lags inflation and real purchasing power falls slightly. The basket costs 24,000 x 1.032 = $24,768 after a year, an increase of $768.

## Part 2: Saving and Compound Interest

**Rates are annual and compounded yearly unless stated otherwise.**

**5. $20,000 is deposited at 4% a year for 5 years. Find the compound amount, the compound interest and the difference from simple interest.**

**Answer:** Amount = 20,000 x (1 + 0.04)^5 = $24,333.06. Compound interest = $4,333.06. Simple interest = 20,000 x 0.04 x 5 = $4,000.00. The difference is $333.06, because compounding earns interest on interest.

**6. $1,500 is deposited at the end of each month at 3% a year compounded monthly for 12 months. Find the final balance and the interest earned.**

**Answer:** Monthly rate = 0.2500%. With deposits at month end this is an ordinary annuity: FV = 1,500 x [((1 + 0.002500)^12 - 1) / 0.002500] = 1,500 x 12.1664 = $18,249.57. Principal = $18,000, so interest is $249.57; regular saving helps, but time and the rate matter most.

**7. At 4% a year, find the number of years needed for the principal to double and compare it with the rule of 72.**

**Answer:** Solving (1 + 0.04)^n = 2 gives n = ln 2 / ln 1.04 = 17.67 years, about 18 years. The rule of 72 gives 72 / 4 = 18 years, close enough for a quick estimate; the gap widens as rates rise. Doubling time is inversely related to the rate, which is central to saving plans.

**8. $500,000 is held in cash with expected inflation of 2.5% for 10 years. Find its real purchasing power after 10 years and the percentage of purchasing power lost.**

**Answer:** Real value = 500,000 / (1 + 0.025)^10 = $390,599. The loss is $109,401, or 21.9% of purchasing power. Cash that earns nothing loses real value under inflation, so returns must at least match inflation, subject to risk.

## Part 3: Demand, Supply and Equilibrium Price

**Prices are in dollars and quantities in units.**

**9. Demand is Qd = 120 - 2P and supply is Qs = 3P - 30. Find the equilibrium price and quantity and explain what equilibrium means.**

**Answer:** Setting Qd = Qs: 120 - 2P = 3P - 30, so 150 = 5P and P = $30; Q = 60 units (check Qs = 60). At equilibrium the quantity demanded equals the quantity supplied, with neither shortage nor surplus, so the market clears automatically.

**10. The government sets a price ceiling of $20. Find the quantity demanded, the quantity supplied and the shortage, and state two consequences.**

**Answer:** The ceiling of $20 is below the equilibrium $30, so it binds. Qd = 80 and Qs = 30 units, a shortage of 50. Queues, rationing or black-market prices above the ceiling appear, and sellers may cut quality or supply, so the shortage worsens over time.

**11. Demand becomes Qd = 150 - 2P with supply unchanged. Find the new equilibrium price and quantity and the percentage rise in price.**

**Answer:** 150 - 2P = 3P - 30 gives 180 = 5P, so P = $36 and Q = 78 units. The price rise is 20%. A rightward shift in demand (more buyers, higher income or changed tastes) makes buyers bid up the price against fixed supply, and inelastic short-run supply makes the rise large.

**12. Price rises from $25 to $28 and quantity demanded falls from 70 to 64 units. Find the arc price elasticity of demand and say whether demand is elastic or inelastic.**

**Answer:** Delta Q = -6 with average Q = 67.0; delta P = 3 with average P = 26.5. Ed = (-0.0896) / (0.1132) = -0.79. Since the absolute value is below 1, demand is inelastic: a 11% price rise cuts quantity by only 9.0%, so revenue rises and the good is likely a necessity.

## Part 4: Firm Costs and Profit

**Amounts are in dollars and quantities in units; show the formulas.**

**13. A firm has fixed costs of $120,000, variable cost of $45 per unit and a price of $75. Find the contribution margin per unit, the break-even quantity and the profit at 8,000 units.**

**Answer:** Contribution margin = 75 - 45 = $30 per unit. Break-even quantity = 120,000 / 30 = 4,000 units. Profit at 8,000 units = 8,000 x 30 - 120,000 = $120,000. Every extra unit adds $30 of profit once fixed costs are covered.

**14. Total cost is $345,000 at 5,000 units and $390,000 at 6,000 units. Find the marginal cost and the average cost at both output levels.**

**Answer:** Marginal cost = (390,000 - 345,000) / (6,000 - 5,000) = $45 per unit. Average cost is $69 at 5,000 units and $65 at 6,000. Average cost falls by $4 while marginal cost is only $45, showing fixed costs spread over more units, a sign of economies of scale.

**15. At a price of $75 the firm sells 8,000 units. It cuts the price by 10% and sales rise to 10,000 units. Find total revenue before and after and the percentage change.**

**Answer:** Revenue before = 75 x 8,000 = $600,000. The new price is $67.50, giving revenue of $675,000, a change of +12.5%. A 25% rise in quantity outweighs a 10% price cut, so demand is elastic and the cut raises revenue, though profit also depends on cost.

**16. A company has sales of $480,000, cost of goods sold $312,000 and net profit $72,000. Find gross profit, gross margin and net margin.**

**Answer:** Gross profit = 480,000 - 312,000 = $168,000, so the gross margin is 35%. The net margin is 72,000 / 480,000 x 100% = 15%. The 20 point gap is absorbed by operating expenses, interest and tax.

## Part 5: Taxation and Public Finance

**Progressive bands: first $50,000 at 2%, next $50,000 at 6%, next $50,000 at 10%, remainder at 17%.**

**17. A taxpayer has taxable income of $240,000. Calculate the tax payable under the progressive bands and the average tax rate.**

**Answer:** First $50,000 at 2% = $1,000; next $50,000 at 6% = $3,000; next $50,000 at 10% = $5,000; the remaining 90,000 at 17% = $15,300. Total tax = $24,300 and the average rate is 10.12%, below the 17% top marginal rate because lower bands are taxed at lower rates.

**18. For the same taxable income of $240,000, what is the tax at a standard rate of 15%? Comparing with progressive tax, the lower amount applies; what is the difference?**

**Answer:** Tax at the standard rate = 240,000 x 15% = $36,000 against $24,300 under progressive bands. The lower amount applies, saving $11,700, or 32.5%. The standard rate acts as a cap, though at very high incomes it can be the cheaper option, which is why both are applied.

**19. Government revenue is $600 hundred million, of which profits tax is $150, salaries tax $90 and stamp duty $60. Find each share and explain the risk of a concentrated revenue base.**

**Answer:** Profits tax = 25%, salaries tax = 15% and stamp duty = 10%, together 50%. These depend on corporate profits and asset markets, so revenue drops sharply in a downturn; a narrow base makes receipts volatile and forces reliance on reserves or a wider tax base.

**20. Government spending is $700 hundred million against revenue of $600, with GDP of $2800. Find the surplus or deficit and its share of GDP.**

**Answer:** Revenue minus spending = -100 hundred million, a deficit of 100. As a share of GDP it is 3.57%. Under 4% is manageable, but repeated structural deficits must be funded by borrowing or reserves, raising interest costs and squeezing other spending, so counter-cyclical discipline matters.

## Part 6: Sustainability and Quality of Life

**Show the working and explain with sustainability concepts.**

**21. A household uses 420 kWh a month and electricity emits 0.7 kg CO2 per kWh. Find annual consumption, annual emissions in tonnes and the cut if use falls 15%.**

**Answer:** Annual use = 420 x 12 = 5,040 kWh. Emissions = 5,040 x 0.7 / 1,000 = 3.53 tonnes. A 15% cut saves 0.529 tonnes, about 529 kg, through efficient appliances, higher air-conditioning set points, LEDs and off-peak use.

**22. A district produces 12,000 tonnes of solid waste a year and recycles 3,600 tonnes. Find the recycling rate and the extra tonnage needed to reach a 55% target.**

**Answer:** Recycling rate = 3,600 / 12,000 x 100% = 30%. Reaching 55% means 6,600 tonnes, so 3,000 more are needed. Each percentage point is 120 tonnes, requiring better sorting, producer responsibility and incentives; cutting waste at source beats recycling, which itself uses energy.

**23. An economy has a GDP of 3.0 trillion dollars and a population of 7.5 million. Find GDP per capita and the new figure if real growth is 3% with an unchanged population.**

**Answer:** GDP per capita = 3.0e+12 / 7.5e+06 = $400,000; after 3% growth it is $412,000, up $12,000. GDP per capita is only an average and ignores distribution, environment, health and leisure, so quality of life needs the Gini coefficient, life expectancy and air quality as well, since growth can also bring pollution.

**24. A city uses 130 litres per person per day with a population of 7.5 million. Find daily and annual water use in million cubic metres, then the percentage and volume saved if use falls to 120 litres.**

**Answer:** Daily use = 130 / 1,000 x 7.5e+06 = 975,000 m3, or 355,875,000 m3 a year (355.9 million m3). Cutting to 120 litres saves 7.69%, that is 27.4 million m3 a year, lowering the energy and cost of supply, a cheap sustainability measure.

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